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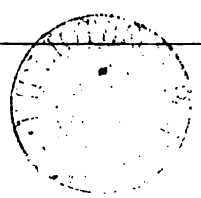

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ORIGINAL PAPERS.

EGYPT AS A WINTER RESIDENCE FOR INVALIDS.

By Edith Pechey, M.D.

It not unfrequently becomes the duty of the physician to advise a patient to seek refuge from the cold dampness, and variable temperature of our English climate, in a land where clearer skies and more genial sunshine prevail during the winter months. But having delivered his opinion on this point, he is at once met by the query, 'Where ought I to go?' and this is by no means an easy question to answer for those who have no personal acquaintance with the various localities recommended as winter residences for invalids. And it is unhappily by no means an uncommon thing to hear complaints from invalids of having been sent to a place which has done them harm instead of good, and where they have been thoroughly wretched all the time of their stay. For my own part, I should always endeavour to find out, to some extent, the tastes and pursuits of the patient, after running over the different localities likely to suit his state of health. To recommend a winter in Luxor, for instance, to a person used to a London life, and unlikely to take any interest in Egyptian antiquities or architecture, would be very much like condemning him to solitary confinement for a period of four or five months. So that it seems to me it would even be better to choose the second best, rather than the best, if it appeared likely to fit in much more decidedly with the mental requirements of the individual.

Then as to climate. The chief characteristics for which we look are those which contrast most strongly with our own climate, viz.: dryness and equableness of temperature. With regard to these points, my impression of the climate of Egypt, though formed after the experience of one winter only in the country, may perhaps be of some service in enabling a fellow practitioner to form a correct estimate of its true value from a hygienic point of view. I must begin by stating that the past winter has been a most exceptionally severe one in Egypt, and up the Nile valley. All the residents to whom I spoke on the subject assured me that for twenty-five years past they had not experienced so cold a winter, and the unwonted severity of the season at Cairo and Alexandria was commented on in the London papers. We left Cairo on January 3rd, and for the first week or ten days it was certainly very cold without fires, so that we were glad of all available wraps, and it was not till we got above Luxor that the weather corresponded to our warm summer weather in England.

There can be no doubt as to the extreme dryness of the air in Egypt. Although it is not true that it never rains, we had but five or six showery days out of the ninety we spent on the Nile. Two of these were just at starting, in the neighbourhood of Cairo, and one was whilst our boat was detained in the cataracts or rapids, where a thorough Scotch mist prevailed the whole of one day. But when we landed at Alexandria on Christmas-day we were told it had rained incessantly for ten days, and rain is by no means unknown throughout Lower Egypt, although rare above Siout. Above the first cataract we had no rain at all. One soon has practical proofs of the dryness of the climate in a Nile voyage. One's hair gets very dry, one's nails grow very slowly and are very brittle, combs and all articles made of horn break upon the smallest provocation, cartridge paper cracks at the folds, to the great annoyance of the artist, linen hung out after being washed is dry in a few minutes, and some gutta-percha, which I had taken in case of surgical emergencies, was in a very short time reduced to a powder. The further one ascends the river the drier does the air become, and as dry heat is more easily borne than moist heat one experiences no discomfort from the increase of temperature as one approaches the tropics; in fact, one thoroughly enjoys there what in Lower Egypt would be found quite oppressive. The air is light and pure, and probably none but those who have tasted desert air can understand the exhilarating effects of the climate in Nubia, where the desert is only separated from the river by a narrow belt of cultivated land, and only a low range of hills breaks the course of the wind which sweeps across the Libyan desert.

With regard to variations of temperature, Egypt is not exempt from occasional sudden and great changes, as marked as those which we so often experience in England. Even during the winter months, or at least in March, the khamsin or sirocco may blow for two or three days, and this may be immediately followed by several days of unusual cold. For instance, on March 2nd-4th we had a very trying khamsin, on March 7th a sandstorm with a cold wind, and on the 10th the wind changed again, the temperature suddenly fell, and we had three or four days as chilly and with as keen and biting a wind as some of our March weather at home. Within four or five days there was a fall from something close upon 100° F. to about 50° F. Such changes are however rare in Egypt. That I have just mentioned is the only one recorded in our log-book during the whole winter. Of much greater importance is the daily variation, that is, the difference between the day and night temperatures; and to my mind the chief and almost only drawback in the dahabeeah voyage for invalids is that this difference is of course very marked in a wooden boat. In Lower Egypt the nights in winter are quite cold; the temperature falls suddenly at sunset for about half-an-hour, when there is a slight rise, followed by another depression just before sunrise, so that one is apt to wake in the morning feeling very chilly. In January, when some hundreds of miles from Cairo, and when the days were quite hot, we still felt the extreme chilliness of the nights, and on some few occasions there was a hoar frost on the deck in the morning. In Nubia, that is above the cataract, this diurnal variation was much less marked, and the nights were only pleasantly cool; but then only a small portion of the traveller's time is spent in Nubia, and the earlier part of the winter is passed in the region of chilly and dewy nights.

Of course in a steamer the distance is more rapidly traversed, and in a fortnight or three weeks one is very near the tropics. But this mode of locomotion, under existing arrangements on the Nile, should certainly never be recommended to invalids. The choice must always lie between the dahabeeah trip and spending the winter in one place. The drawbacks of the life on a dahabeeah are the slight protection afforded from the changes in temperature by the wooden walls of the boat, the necessary smallness of the cabins and saloon, the distance from friends and from medical assistance, and lastly, if the party has not been judiciously chosen, the danger of finding one's self with uncongenial companions. On the other hand, the life is a very enjoyable one; there are few days which may not be spent by the

greatest invalid on deck, whence a constant variety of scenery presents itself, all the surroundings are novel and interesting, the food and cooking are generally excellent, if a good dragoman has been secured, and one is as much master as in one's own house; the boat may be stopped when and where one pleases, and kindness and affability secure the ready services of a willing and happy household. For cases of overwork nothing could be devised more calculated to restore and strengthen the intellectual powers than the Nile trip, and here no physician need hesitate for a moment. There is perfect rest, no railway bustle or jar, the variety of travelling in fact without the fatigue, with the constant enjoyment of sunshine and fresh air. Phthisical and rheumatic patients, too, will derive immense benefit from the voyage if care is taken to impress upon them most distinctly the imperative necessity of going below deck directly the sun sets, and of remaining pretty late in bed in the morning until the weather gets quite warm. All the way up to Luxor the mornings are very cold till near ten o'clock, and as there is no possibility of getting a fire, the only way of keeping warm is to stay in bed. This ought not to be considered a hardship, as such an arrangement still leaves nearly eight hours to be spent on deck in the sunshine, and with congenial companions the evening may be spent very pleasantly in the saloon. It is a good plan to have dinner at the hour of sunset, and then invalids should not go again on deck.

There are two places to select from for a stationary residence—Cairo and Luxor. In Cairo there is plenty to interest the European in the bazaars, and in watching the novelties of Eastern life; and in the Hotel du Nil one can secure the comforts so necessary to an invalid. A house, too, ensures greater protection from the rapid radiation at night, and the temperature rarely falls uncomfortably low after a warm day. On the other hand, the winter temperature is of course considerably lower there than in Upper Egypt or Nubia, and there are occasional spells of comparatively cold weather, whilst the rooms are without any appliances for warming. This is the case in almost all Cairo houses, with the exception, I believe, of a few rooms in the New Hotel. Luxor does not seem to me to present advantages over Cairo in the matter of climate sufficient to compensate for the extreme dulness of the life there, and the inferiority of the hotel accommodation to that to be had in Cairo. What is wanted is a really good Sanatorium, with a competent doctor, established above the first cataract, beyond the reach of sudden changes and night chills, in the delicious Nubian air, which the invalid might reach by steamer in about a fortnight from Cairo. At present no such undertaking has been attempted, and of course the charges must necessarily be high to repay the trouble and expense attending such an enterprise; but I feel certain that few, if any, spots on the whole globe would offer such a chance of recovery to phthisical and rheumatic patients, and that a winter spent there would be the means of restoring many a one to health to whom the English climate offers only a few miserable months of life.

An interesting account of experiments in disinfecting letters by the Hungarian authorities to exclude the Russian plague is given in Liebeg's *Annalem*. Exposing the letters loose in a wire net in an air bath containing a little crystallized carbolic acid at 140°, was found to destroy all living organisms.

STRUCTURAL SANITARY WORK, ITS DESIGN AND EXECUTION.

By John S. Hodgson, C.E.

The Sanitary Record of May 15th, in again directing public attention to the question of 'Wholesome Houses', puts forward some highly pertinent remarks upon the faulty manner in which private drainage work is almost universally performed. Those who have had opportunities of becoming familiar with the subject will be able to bear testimony to the glaring apathy which characterises local authorities generally in their consideration of such an important branch of sanitation, and will readily agree that a decided change is needed. The appointment of skilled officials to supervise the design and execution of such works, as suggested in the article under consideration, would go far to produce the desired amendment; but it would be idle to disguise the fact that the fulfilment of this essential requirement seems to be as remote as ever. Sanitary legislation, in its present stage, fails to insist upon any standard for executive officials, and the experience now available nearly all goes to show that Local Sanitary Authorities, so far from regarding their work in an enlightened spirit, only too readily avail themselves of this serious omission. Such, at least, is the deduction to be drawn from the absence of engineering officials from all but the larger and more important areas, such as boroughs, a state of things which prejudicially affects not only the efficiency of the private drainage but every other branch of sanitary work in addition. While yielding to no one in my advocacy of correct principles, careful design, and superior workmanship in the execution of private drainage work, I cannot but think that the defects existing in the public sewers of towns and villages, not only in old works, but in the systems now being carried out, are too readily passed over, even by those who would not knowingly condone such faults. It seems to be assumed that work of this public character, involving the outlay of considerable sums of money, must necessarily be undertaken only with a full sense of the responsibilities attaching thereto; and that every precaution is consequently adopted to ensure success in each essential particular. One reason for this easy confidence may be found in the fact that whenever loans are required for the carrying of such schemes into effect, the supposed guarantee of a Local Government inquiry, by an engineering inspector of undoubted ability and experience, is always secured. This is no doubt true, so far as the holding of the inquiry is concerned; but to those who are in a position to note the steps consequent upon the inquiry, the hollowness of the guarantee becomes in many instances only too painfully apparent. Not many days ago, for instance, I had an opportunity of inspecting the execution of extensive sewerage works for an important district in the county of Durham. An inquiry had been duly held, at which plans, sections, and details would doubtless be laid before the Inspector, upon whose report the expenditure of the large sum required could alone be sanctioned by the Local Government Board. It might, therefore, have been thought that such matters as the direction and depths of the sewers, the construction of the manholes, and the provision of flushing and ventilating arrangements, would have received a befitting amount of attention, and that, if modern requirements in these respects had not been sufficiently borne in mind in the preparation of the scheme,

necessary modifications therein would have been relentlessly enforced; say, for instance, upon the excellent basis of the printed 'Suggestions' issued by the chief engineer of the Local Government Board. It may be, possibly, that this course was followed in the instance under review, but, as a matter of fact, my own inspection of the actual work only showed that the scheme was being carried out in defiance of the most elementary sanitary principles. To begin with, pipe sewers were being laid in whatever might happen to be the direction of the street or road, instead of in absolutely straight lines with shafts or chambers at the angles. It will be apparent that with pipes of such large diameters as eighteen and twenty-one inches (these being the sizes I saw), a wide gaping space must be left at one side of each joint wherever laid in such disjointed curves as those to which I refer, while, in addition, the amount of puddle used was totally inadequate, even for pipes truly butted together, as in straight lines. Other advantages accruing from the adoption of the straight line system (which is surely no novelty in the present year of grace), such as easy permanent inspection and simplicity in the registration and finding of junctions for branch drains, were evidently regarded as of no moment whatever. The negligence as regards levels was, however, a still worse feature than the above; the sole apology for sight-rails being mere shapeless cross-battens, nailed to a single upright plank, the latter depending for its support upon a sewer pipe, standing at side of trench. *The cross-battens were fixed by the workmen themselves* as the work proceeded, it being thus quite impossible that the sections are being adhered to with any degree of accuracy, or that any uniformity of gradient can exist in the finished work. The manholes were of very inferior construction and workmanship, and the value of the open ventilating gratings was greatly reduced by the absence of any provision for intercepting road-dirt and preventing its admission to the sewer. Moreover, the bottoms of the manholes were flat throughout their whole area, instead of being channelled for the conveyance of sewage. One result of this must be that putrefying matter will accumulate in the manholes, giving off, especially in hot weather, a delightful variety of the foulest odours imaginable by means of the otherwise beneficial open gratings. The number and distance apart of the gratings were not arranged upon any discoverable system, and, to conclude this dreary catalogue, no attempt to provide flushing appliances was anywhere discernible.

I have enumerated at some length the many defects found to exist in this particular instance, not from any desire to give it excessive or undeserved prominence, but because it shows more clearly than any theoretical dissertation could do that the Local Government Board's control over the structural sanitary work of the country, as at present exercised, is of extremely small value in preventing the perpetration of huge and costly blunders, even where the intervention of that Board is obligatory. As an example of what may happen where this intervention can be dispensed with by a Local Authority of insanitary and cheeseparing tendencies, I may cite the case of the town from which I write, where works for securing an increased amount of drainage-area for water-supply have been carried out in such a manner as to call forth an energetic, but unheeded, protest from the Medical Officer of Health, on the ground of sewage-contamination. No plans for this work have ever been prepared, and the whole has been conceived and executed as if the experience of the last thirty years in the yield of water and in the causation and propagation of disease had never been accumulated. The Local Government Board, as the central Health Authority, has no official cognisance of this work, excepting such as may have been derived from their copy of the protest above referred to, upon which, however, no action has been taken at the time I write. And yet it is eight years since the Public Health Act was passed, and no less than thirty-two years since the establishment of a General Board of Health for the whole country. *Cui bono?* it may surely be asked!

In the face of such statements as those I have made (and I have no reason to believe that they refer to extreme or isolated cases, though occurring in two adjoining counties), it will be admitted that much more than a mere reform of private drainage work is required. How, for instance, can efficient bye-laws for this work be enforced in such districts as those alluded to, in which the first principles of sanitation are ruthlessly ignored by the Local Authority in their own expenditure of public funds? The officials in charge are clearly not qualified for such work, and, even if they were, property owners would have some amount of justification on their side in declining to carry out stipulations, in private work, which are not made to apply to the equally important undertakings of the controlling authority. The force of a good example is not a power to be despised in such a matter, neither can the dangerous influence of a bad lead be safely ignored.

The article which has called forth the present remarks closes with the suggestion that the assistance of the engineering element in sanitary work is as necessary as that of the medical profession. I cannot but regard this as the key-note to a solution of the problem under discussion. It is, at any rate, a consideration the force of which has hitherto not been sufficiently estimated, either by the Local Authorities or by the framers of existing legislation as to the work of these bodies, for while the qualifications of the Medical Officer of Health are clearly defined there is no condition of ability attached to the holding of the office of Surveyor, and in rural sanitary districts not even the existence of an official passing under this designation is required. The supposed financial difficulty or pecuniary hardship involved in the appointment of really efficient engineers over sanitary districts can be entirely obviated by the system of combined areas, but, so far from attaching any weight to any cry of this sort, I am satisfied that the unwise objection of Local Authorities to submitting themselves to technical advisers is the real obstacle which has to be contended with. Even Medical Officers of Health, appointed in virtue of an established law against which all objections are futile, do not fail to experience this deeply-rooted antipathy to the behests of skilled and zealous officials on the part of their nominal employers. In like manner, the conditions which would be laid down by competent engineering officials in such matters as the design, construction, and management of necessary sanitary works would be sure to meet with uncompromising opposition, based partly upon real ignorance as to their utility and partly on the additional outlay which their observance would necessitate over the cost of cruder and less efficient ideas. It is evident, therefore, that whenever the long-delayed introduction of the engineering element into the details and routine of sanitary work is to be effected,

due provision must be made for securing the status of the officials so appointed, in order that they may be sufficiently independent of local prejudice and caprice. In no other case will it be possible to induce qualified engineers, who have made sanitary work and requirements the object of their studies, to relinquish other prospects and advantages. The securing of a reasonably safe tenure of office for technical officials will have to be considered in due time.

When this time may be, I do not attempt to predict, but it may at least be suggested that the division of the country into County Board Districts, under the now inevitable County Government Act, would offer a good opportunity for creating a connecting link between the Local Sanitary Authorities on the one hand, and the Local Government Board, or other central health authority, on the other. The appointment of superior sanitary officials, both medical and engineering, is a duty which I should prefer to see placed in the hands of a county authority, of sufficient weight and representative capacity, rather than left to the tender mercies of those possessors of limited ideas who in too many instances form our present local boards. Whether the county sanitary staff should be a wholly local establishment, or whether some such arrangement as the present joint payment of salaries by the central authority should be adopted, is a matter which I consider of small moment so long as the need for permanent efficiency, as opposed to mere present economy, is constantly kept in view. To a neglect of this consideration I am led to attribute a large share of existing sanitary shortcomings, such, for instance, as the two examples with which I have endeavoured to illustrate the present article.

Since forwarding the foregoing remarks for publication, the Society of Arts' Conference on Public Health has been held; and, judging from the full report of the proceedings now available, the formation of County Boards may be anticipated at even an earlier date than I had previously believed probable. At any rate, the opinions of leading authorities on local government unite in condemning the wide gap at present existing between the guiding and the executive authorities, and in advocating the creation of an intermediary body to which the latter shall be subject. The advantages of this step, as bearing upon the views to which I have given expression, are manifestly great, as checking, on the one hand, an excessive and futile degree of centralisation, and preventing, on the other, the ill-advised proceedings which are now only too common among uncontrolled local authorities.

IMPURE AIR AS A CAUSE OF DISEASE;

OR THE INFLUENCE OF SANITARY SURROUNDINGS ON HEALTH.

By J. WARD, M.D.,

Medical Officer of Health, Cockermouth Union Rural and Keswick, Cockermouth and Workington Urban Sanitary Districts.

THE late Dr. Parkes, in his *Manual of Practical Hygiene*, remarks that 'statistical inquiries on mortality prove beyond doubt that of the causes of death which usually are in action, impurity of the air is the most important; and, whilst admitting that the inquiry touching the bearings of the subject is in its infancy and difficult, it, nevertheless, demands a more searching investigation than has been, or perhaps than can be, at present given.' He also remarks, 'The evidences of injury to health from impure air are found in a larger proportion of ill-health—*i.e.*, of days lost from sickness in the year—than under other circumstances; an increase in the severity of many diseases, and a higher rate of mortality, especially among children, whose delicate frames always give us the best test of the effect both of food and air. In many cases accurate statistical inquiries on a large scale can alone prove what may be in reality a serious depreciation of public health.' The same author sums up as follows. 'The diseases produced by fæcal emanations on the general population seem to be diarrhœa, bilious disorders, often with febrile symptoms, dyspepsia, malaise and anæmia; all these being affections of digestion or sanguification; typhoid fever is also intimately connected with sewage emanations, either being their direct result, or, more probably, being caused by specific products being mixed with the sewage. In addition, sewer air aggravates, most decidedly, the severity of all the exanthemata, erysipelas, hospital gangrene, and puerperal fever, and probably has an injurious effect in all other cases.'

Speaking of air rendered impure by respiration, the same author remarks, 'In addition to a general impaired state of health arising, probably from faulty aëration of the blood, and to phthisis and other lung affections which may reasonably be believed to have their origin in the constant breathing of air vitiated by the organic vapours and particles arising from the person, it has long been considered, and apparently quite correctly, that such an atmosphere causes a more rapid spread of several specific diseases, especially typhus-exanthematicus, plague, small-pox, scarlet fever, and measles.' Elsewhere he says, 'Bronchitic affections are frequently produced, which are often attributed to the change from the hot room to the cold air, but are really probably owing to the influence of the impure air of the room on the lungs.'

Dr. Cornelius Fox, in his *Handbook for the Medical Officer of Health*, says, 'I have always maintained, and increasing experience has only confirmed my previous conviction, that the impure condition of the air of our houses, be they factories, public buildings, or dwelling-houses, has much to do with the great prevalence of such diseases as phthisis-pulmonalis, bronchitis and pneumonia, which together make up nearly one quarter of the total mortality; and if we could strike a telling blow at that great universal evil—namely, poisoning by impure air—we should do much to save life.'

I here lay before my readers certain results, obtained in the pursuit of the inquiry, as to the effect of impurity of the indoor atmosphere on health, whether such impurity arise from excrement emanation of man or beast, or from the breathing of re-breathed air.

Taking, first of all, pneumonia, a disease which some medical writers have shown to have a disposition to occur during gastric and bilious disorders, especially at certain seasons, as in the autumn or in early spring, during the prevalence of north-east winds, and, more particularly, in constitutions debilitated by the eruptive fevers, or from other causes. The frequency with which adynamic types of the disease have been associated with typhoid fever, has led some to suppose there might be a more or less etiological relationship between the two affections.

Dr. Aitkin, in his work on medicine, remarks, 'In truth, no disease shows more forcibly than cases of

pneumonia do, especially as regards their diagnosis and treatment, that every individual case of disease requires to be made a special study as regards its individual history, progress, combination, and sequence of symptoms.' What does this imply but that, for the most part, there are associated physical causes of the disease which have not been interpreted? If we take into our etiological calculations this product of the sewer, or of decomposing animal excrement, to which we, with our modern domestic arrangements, are, unfortunately, so largely exposed, I contend that we have a causative agent which tends to throw considerable light on the obscurity which enshrouds the causation of many diseases. This will be the more apparent if we are open to admit that water trapping is but, at best, an imperfect and unsatisfactory safeguard against the diffusion of sewer air within the house, of which there is a constant danger from the varying density of the air in the sewers and that of the dwelling. The importance of the inquiry is the more apparent if we are free to admit, what has been stated, that pneumonia, together with bronchitis and pulmonary consumption, make up nearly one quarter of the total mortality.

Taking, then, first of all, pneumonia; as the result of my experience, in the capacity of medical officer of health, for a term of about twelve months, during which period my attention has been more particularly turned to the subject: out of eight fatal cases, occurring in various parts of one or other of the urban or widely-extended rural-sanitary districts in the north-west of England, with which I have to do, as observed in children or in people of middle life—to the exclusion of cases occurring to those advancing in years, the fatality of which might be attributed to the enfeebling effect of age, to a greater or less extent—in connection with all, save one, I detected cause of defilement of the air of the house from filth influence. In three of the cases a byre or stable immediately adjoined the dwelling; and in the remaining four filth influence, from inside or immediately adjacent water-closet, with unventilated soil-pipe or drain, was detected.

With reference to allied affections of the respiratory organs, Rammazzini states that sextons, entering places where there are putrefying corpses, are subject to malignant fevers, asphyxia, and suffocative catarrhs.

Niemeyer, when speaking of acute bronchial catarrh as forming a symptom of typhoid fever, measles, and small-pox, says, 'Here it must be looked upon as a result of the morbid state of the blood which has absorbed some deleterious material, with the nature of which we are unacquainted'.

On investigating the sanitary surroundings of about ninety fatal cases of diseases of the respiratory organs, other than pulmonary consumption, for the most part of an acute or sub-acute character, I observed, generally and with few exceptions, as before, undoubted defects of ventilation, as from absence of fireplace, or air-shaft in lieu thereof, in the bedroom; whereas, in some of the instances, this essential requisite of each inhabited apartment, when provided, was rendered inoperative, in consequence of undue draught or down-smoke from a conjoined or adjacent flue, by being boarded, stuffed or papered over. In some instances the child had been put to sleep with its parents—the bed, moreover, being placed in a recess or close corner of a small, over-crowded room—to breathe their devitalized breath the live-long night. In about one-fourth of the number of fatal cases investigated, filth influence, defiling the house-atmosphere, seemed to be causatively associated with the fatality, as before mentioned, from immediately contiguous, imperfectly ventilated and badly-drained byre, stable, pigstye, filthy privy, water-closet or drain.

Whilst free to admit that during the treatment of acute inflammatory diseases of the lungs, it may be thought necessary, especially in winter, to secure warmth, and that it might be said inspection of these properties had been undertaken prior to the removal of the special provisions for the attainment of this end, yet inquiry elicited the fact that, in the great majority of instances, the provision for ventilation or interchange of air, during the night season, had, for a long time previously, been reduced to a minimum.

The dense nature of the stone which forms the chief building material of my district—the Skiddaw slate—and the thickness of the walls of old houses, might appear to have contributed to this fatal result; and also damp from want of eaves-spouting or from position of the dwelling-house against and below the surface of the ground. In many instances it has been the practice in this, as in some other districts, to build farm-buildings, stables, cow-houses and the like, alongside and under one continuous roof with the dwelling-house; probably in order that the farmer might, with greater facility, be apprized of any illness or attempt at theft of his steeds—a mode of relieving neighbouring countrymen of their property not unknown in the days of border raids—and in part, perhaps, to save the expense of an additional gable, which a detached building would have entailed. The practice, whatever its origin, has told very prejudicially, in many instances, on succeeding generations, and even now there is a tendency to perpetuate the evil.

Again, in the transformation of old residences into cottage dwellings it has been the practice, in not a few instances, so to divide and subdivide the structure that bed-rooms have been formed without any fireplace or other provision for the constant interchange of air. Old stables and byres, adjoining the mansions of past generations, have, in these practical days, also been converted into cottages, and it cannot be matter of surprise what results have followed on the luckless occupants.

Until within a very recent period it has been the practice of certain builders to leave some of the smaller bed-rooms without fireplace or air-shaft in lieu thereof, and Sanitary Authorities, by whom plans of dwelling-houses have been passed, have not always corrected the error.

Referring again to the result of sanitary inspection in this district during a period extending over twelve or eighteen months in which measles have been more or less prevalent, out of some thirty fatal cases of lung-complication supervening on the disease, undoubted defects of ventilation, of a similar nature to the above, have, almost without exception, been observed. In many instances, as before noted, the bed-room, small as to size and utterly inadequate in itself as to cubic area, has been found destitute of fireplace, air-shaft, or other suitable and proper provision for the constant interchange of air; in others, again, the chimney-flue had been kept sedulously closed, and, in a not inconsiderable proportion of instances, filth influence from a contiguous water-closet, with unventilated drain-pipe in connection therewith, filthy privy or other similarly objectionable influence, has been observed.

In some forty fatal cases of whooping-cough or of

the subsequent lung-complication, which have recently occurred in this district, similar insanitary physical causes appear to have been at work. In a very large proportion of these fatal cases, also, the bed-rooms were destitute of fireplace, air-shaft, or suitable provision for constant ventilation, or, if this had been provided, the defects associated therewith had rendered its application practically inoperative. Bed-room chimney-flues were found, when existing, for the most part boarded or stuffed up; in other instances the bed, where the deceased had slept, had been placed in a recess or corner of the room where the air was specially stagnant; and, in other cases, overcrowding came to aid in the establishing what seemed, gathering weight as the inquiry extended, a well-nigh invariable neglect of the laws of health in this particular. In some sixteen out of the forty fatal cases, filth influence from immediately contiguous byre, pigsties, stable, water-closet, or sewer influence was noticed.

It might appear to savour of the *post hoc ergo propter hoc* kind of reasoning if I observed, as I am nevertheless compelled to do, that the sanitary investigation of the interior and surroundings of houses where inflammatory affections of the brain have occurred, forces the conclusion that diseases of this class, also, are not infrequently, and it cannot but be inferred causatively, associated with similar insanitary conditions.

Out of some twenty-eight fatal cases of this nature, observed during a similar period, filth influence, from immediately contiguous byre or stable, imperfectly ventilated water-closet; or from sewer influence, as from slop-stone waste-pipe communicating—save imperfect trapping—directly with the sewer, or from drains coursing underneath the house, was observable in some seventeen out of the number; whilst unmistakable defects of ventilation were noted, as from absence of fireplace in the bed-room, or the rendering inoperative of this provision, in almost every other case out of the entire number.

If some seventeen fatal cases of tubercular meningitis be added on to these, we find exactly similar influences at work almost without exception.

Again, in some twenty-two cases of, for the most part, primary convulsions in children, I found like filth influences and defects of ventilation associated with them, whilst many other diseases of infants and young children seemed causatively conjoined with similarly insanitary conditions, such as those returned as dentition, marasmus, atrophy, and the like.

The influence which insanitary conditions exert on diseases of the zymotic order seems now a generally admitted fact; whilst few are to be found who deny the causative association of tubercular diseases with defective ventilation, or the breathing of impure rebreathed air. During a similar period, as above referred to, I have to note fourteen fatal cases of tabes-mesenterica, where in almost every instance the bed-room occupied by the deceased was either destitute of fireplace, air-shaft, or other suitable provision for the interchange of air, or, if such provision existed, its utility was practically ignored. Contiguous filth influence was not so frequently noticeable in connection with this disease as in those of an acute or sub-acute inflammatory nature, affecting specially vital organs, as the brain and lungs.

There can be little doubt but that the influence of insanitary causes bears a most important part in the production of disease in many of its forms; of local diseases, of some termed constitutional, as well as many of those of the zymotic order. The bearings of the subject are not, I submit, sufficiently weighed by medical writers, except by some of continental celebrity, who very judiciously advise their readers, and may thus indirectly point to sanitary investigation, to fulfil the causal indications when speaking of the treatment of various diseases.

Should it be contended that too much of etiological simplification would tend to disparage the profession in the eyes of the public, the fallacy of such an idea is, I think, self-evident, in these days of general intellectual activity. The subtle influences which affect the threefold nature of man—body, soul and spirit, with two parts of which nature, at least, the physician has to do, are of themselves sufficiently complex to tax the most accurate judgment, whilst the *vis medicatrix naturæ* frequently stands in need of the most skilful application of the therapeutic agent for its furtherance.

Take a case recently brought under my own immediate observation. The parents of a certain child change their residence, and, from a house comparatively healthy and free from filth influence, come to occupy one with objectionable container water-closet, presumably with cesspool arrangement and unventilated soil-pipe, also with scullery waste-pipes communicating immediately with the sewer, and with huge cesspit of privy and ashpit—in all probability imperfectly secured against filth infiltration—under one continuous roof with the back kitchen. Their promising boy, of some six years of age, previously healthy to all appearance, is exposed, shortly after change of residence, to some slight risk of chill and, when evidencing symptoms of illness, is placed to sleep in the bed-room over the kitchen, where the warm air rising from beneath is largely impregnated with filth influence from the slop-stone waste-pipes of the adjacent back kitchen and from the objectionable cesspit of the privy close alongside, and under one continuous roof therewith; in addition to which, the house atmosphere was further rendered impure from the objectionable water-closet arrangement above mentioned. The symptoms are those of peritonitis; but the remedies employed—presumably proving successful in other instances less adversely circumstanced—are, in this case, speedily followed by a fatal result; an issue which appears to me to be physically owing, in no small degree, to the unpropitious surroundings of an insanitary nature which I have pointed out; evils, moreover, perhaps not duly appreciated by the medical attendant who might have more successfully tided over the crisis had he removed his little patient to a part of the house, in the basement, further removed from filth influence.

Take another case brought before my notice in the course of sanitary inspection quite recently. A family came to occupy a badly ventilated, back-to-back cottage, situated almost immediately over a water-closet having no drain ventilation. In the course of a comparatively short time, the head of the household succumbs to pneumonia, so far as I can judge from the description of the disease given by the widow; later on, a son, a young man who previous to residing here enjoyed good health, and whose occupation, moreover, that of a blacklead pencilmaker, could not be considered to be particularly unhealthy, suffers also from an attack of pleuro-pneumonia. Though surviving the acute symptoms, his recovery was unsatisfactory, and symptoms of empyema supervene, which, after prolonged existence and the accession of nephritis, terminate fatally. The poor widow, thoroughly disheartened,

is left to eke out, for herself and other members of her family still surviving—and whose very life, under the adverse circumstances pointed out, cannot fail to be endangered—a precarious existence by taking in washing. Surely we may reasonably suppose that, under more favourable sanitary surroundings, a large amount of this suffering and, as we term it, premature death, might have been prevented.

Suffer another history, which appears to have more than a fanciful connection with assignable physical causes, occurring in a farmhouse, in a hilly country district, where the cow-house is under one continuous roof with the dwelling-house, and occupies a site on higher ground than the latter, though a barn intervenes which, if freely ventilated, may tend, in a greater or less degree, to isolate the house-atmosphere from the adjacent filth influence. The father of the family, of middle age, has an attack of apoplexy, which is followed by protracted paralysis for many years, and from which he never recovers; other members of the family frequently suffer from erysipelas, and manifest a tendency to bronchitis; one of the two daughters, remaining at home, a celibate, dies of cancer; the other becomes an inebriate. These are but typical cases, constantly recurring, and the like of which will continue to operate until central authority comes to the aid of local sanitary administration in effecting a remedy; though a far-seeing individual may, now and then, avoid the exposure of his family to such dangerous influences.

The late Count Bunsen gave this sage advice to his friends, 'In house accommodation live above your means, in clothing up to your means, and in food below your means'.

Should it not be the aim of sanitary administration to secure for each habitable room, and especially in the overcrowded cottages of the poorer classes, some suitable provision for the constant interchange of air? The amount of cubic space without this provision is, comparatively speaking, a vague and indeterminable quantity, and seldom, if ever, meets the requirements of health.

The Barrack Commissioners recommend a minimum space of 600 cubic feet for each man; insisting, at the same time, that the air should be renewed twice every hour. How far short of this requirement the greater part of the dwellings of the poorer class fall, and how utterly inadequate is the usual provision for the interchange of air without prejudicial draught. How many small overcrowded bedrooms are there which have no provision for permanent ventilation, and how frequently is this to be found where, on the part of the occupants, from various causes it may be, there is a morbid dread of the outer air; where the enfeebling, disease-producing, pre-breathed, fœtid atmosphere, forms the lung ailment during a very considerable part of the life of the unfortunate inhabitants. The sad lack of attention to this important matter of detail is evidenced by the number of plans for houses recently passed by sanitary authorities, if I may judge of other places by what is found in this part of the kingdom, where rooms have been permitted to be built without any fireplace, air-shaft, or other suitable provision for ventilation.

As for the enforcement of this provision in old properties—a department of work to which all sanitary boards should, through their officials, address themselves—the work is, at present, very uphill and difficult. The public and their representatives, the elected sanitary authorities, are not alive to the important bearings of the work; and the prying nature of house-inspection, together with the difficulties sometimes attending the provision of even an inexpensive and simple means of remedying the defects pointed out, on the one hand from failing to meet the requirements of the particular case, and, on the other, from inability or reluctance on the part of the owner to defray the cost, call for a more general and unanimous, and, therefore, less apparently singular and obnoxious, effort in this direction.

When once a plan has been passed by a sanitary board for the erection of a dwelling-house, it is a difficult task for the Medical Officer of Health to have to point out its defects, although he may have been no party to the sanction of the plan. Take, for instance, the important point of the relative position of the door, window, and fireplace of a bedroom. When these are placed at one end of the room, the far end—where the bed or beds are usually placed—forms a *cul-de-sac*, where the air stagnating soon becomes very detrimental to the health of the occupants; a suitable air inlet in such a position, even if free from the supposable objection of unduly admitting the cold air, is seldom, as far as my experience goes, provided. How frequently does the careful and diligent sanitary investigator find that existing provision for interchange of air has been rendered inoperative by the closure of the chimney flue owing to down draughts, which the provision of a suitable chimney can or pot might have prevented.

In certain country districts the Medical Officer of Health is thus repeatedly called to witness the evils resulting from filth influence pervading the house atmosphere from immediately contiguous byre, stable, or the like, and inasmuch as, in exceptional cases, evil may not apparently result from such an arrangement of the house and farm buildings, as when efficient drainage and free ventilation is secured, and although old-fashioned, time-honoured custom seeks to perpetuate the evil, yet is it undoubtedly the duty of the Medical Officer of Health to protest against the perpetuation of the defect, as well as to endeavour to improve old properties, where defects of this nature are apparent, by securing free ventilation and efficient paving and drainage, as severally applicable.

This work in such cases dovetails into that of the county cattle diseases Inspector's department. When a raid has been made on our badly-ventilated, filth-saturated cowhouses, and when powers have been secured—as by the withholding of compensation, in whole or in part, for cattle slaughtered on the outbreak of epidemic disease, if the internal sanitary arrangements of paving, channeling, ventilation and cleanliness do not come up to a certain standard—to enforce the requirements of the laws of health as affecting cattle, we shall have a lighter county rate, and fewer cases of pulmonary tuberculosis, grapes, clyers and its synonymes—affecting the quality of our meat-supplies, and through it the health of the public. The more thorough ventilation, on approved principles, so as to obviate draught, of some of our large cattle auction marts, together with the removal of all offensive gullies, which continue to pour forth their offensive odour, outside the buildings—a similar precaution advisable in all cow-houses or stables—well deserves the attention of the proper authorities; great danger to cattle, exhausted by long driving or travel, would thereby, it would appear, be the more avoided. In some towns it is too much the practice to place cottage water-closets—which, as a rule, at least in this district, are unprovided with suitable drain and summit

ventilation—under one continuous roof with the back kitchen or scullery, and the consequence is that the warmer, more rarefied contiguous house-atmosphere attracts the mawkish odour which is so constantly apt to escape from the closet, especially when the drains are imperfectly flushed; and when defective ventilation, both of the dwelling and the water-closet—in each case the rule rather than the exception—is added to this, the effect on the health of infants and other inmates, whose health may be temporarily or permanently enfeebled, is but too sadly apparent, though its tardy deleterious effect on others may be overlooked.

I have recommended and induced one or more of the urban boards with which I have to do, to enforce an isolated position for this house appendage, in new properties of the cottage class, even though at some sacrifice of architectural neatness. This recommendation has seemed the more needful from the state of fouling and block of private drains, constantly recurring, which I attribute sometimes to the carelessness of the householder in failing to flush well after the use of the closet—an argument for the use of trough-closets in cottage properties—or to the large diameter of the drain-pipe, which permits of the passing or trickling by of the water, and the retention of the tenacious clayey deposit at the sides, which, accumulating, eventually blocks the drain. Were it not that the careless householder is apt to allow floor cloths or other improper articles to be thrown down the closet, a four-inch drain-pipe is, in the opinion of certain practical men, better than one of larger diameter, as permitting of a more effectual cleansing with a given volume of water.

Where this state of block of private drains is apt to occur, sanitary boards should provide, at suitable cost, means for periodical flushing by means of the town's hose, and should accordingly inflict a fine on any owner or occupier of property where this state of neglect is permitted to endanger the health of neighbours. The objectionable, dangerous and costly practice of opening up private drains would then be, to a considerable extent, obviated. How often does fatal illness occur in connection with such a state of block or cleansing of private drains?

As the immense and extended bearing of sanitary science on disease as a whole becomes more intelligently recognised, the discrepancies of treatment, as sometimes noticeable, will receive more satisfactory solution in some instances; whilst the aid to the efficient supervision and management of individual cases becomes, in a corresponding ratio, more tangible and reliable. I speak of human instrumentality as acting in accordance with the great principles of health laws, so harmoniously in concert with the Divine Author of all intelligence and truth.

We come further, taking a retrospective historical view, to realise more fully the physical advantages, as interpreted by health laws, of the ancient Jewish suggestion of 'Shinnui Mokom',* or change of place, which was so frequently followed by the most satisfactory recovery of the sufferer; whilst insight into health conditions and requirements—bearing in mind the immense importance of a pure house-atmosphere—directs the aim of the physician towards the securing for his patient a separation or removal, as far as possible, from any influence which would further depress the vital tone already lowered and enfeebled by the inroad of expressed disease.

If any insanitary influence, detected by the expert, be at hand, and incapable of removal, it would seem to be in accordance with the dictates of sound judgment to secure the immediate removal of the sufferer to a comparatively healthy atmosphere, if practicable (and, remembering that a desperate disease requires sometimes a desperate remedy, when could it be said to be impracticable if energy and will be brought to bear)—uncontaminated by any insanitary influence; and by so doing, we may speedily obtain, in many instances, improvement in health and amelioration of untoward symptoms?

* Talmud Babli, Rosh Hashana, 16 B.

NOTES ON INDUSTRIAL DWELLINGS.

By Elijah Hoole.

VI.—TENEMENTS.

Unsatisfactory as the one-room tenement is when regarded from a sanitary point of view, there are classes in our town population for whom it is too costly and for whom a still simpler kind of lodging has to be provided. Many single men and single women who are at work all day require a bed-room only. They have no time to spend on cleaning this room, and no money with which to furnish it, but can afford to spend sixpence per night or less in rent if the furnishing, cleaning, etc., be done for them. The Coffee Tavern Company has provided a number of such bed-rooms in London, and the method they have adopted is worthy of extensive imitation, since it has succeeded both pecuniarily and in other ways. Above the rooms in which the manager of the tavern and his family live, which are usually immediately over the tavern itself, a number of small bedrooms or cubicles are formed, each having its own door to the passage or staircase, and its own window to the external air, and being just large enough to contain an iron bedstead and a fixed shelf for washstand, leaving space for a box if the tenant happens to have one. A gas bracket and a few coat and hat pegs complete its furniture, while its toilet appliances are limited to a small fixed looking-glass and a plain white ewer and basin. The bedding is plain but comfortable, and the beds are made and the cubicles kept in order by the manager's wife or her deputy. The manager exercises the necessary control, allowing no one but the lodgers to go upstairs, and turning out the gas at the appointed hour. In the day time, the various accommodations of the tavern are available for the tenants, who take some meals there, and thus increase its receipts. Great facilities both for comfortable and economical living are thus placed within reach of the working man at an exceedingly low price, while to the tavern proprietors a useful mode of appropriating the upper rooms of the tavern building is afforded, thus relieving them of the difficulty of finding appropriate and profitable use for the upper rooms, the ordinary coffee tavern customer having an insurmountable objection to go upstairs for refreshments.

Another plan which seems needed for the housing of a section of the lower stratum of our town population is open to many grave objections in its ordinary form of a common lodging-house; and yet it is difficult to see how some equivalent for it can be altogether dispensed with, since it is the least costly mode of housing single persons of either sex, though certainly not the one to be most desired. The entire absence of privacy, and the close contact into which the inmates of the ordinary common lodging-house

are thrown are very objectionable from their demoralising character and from the entire absence of everything like family life. Common lodging-houses in which men alone, or women alone, are accommodated, are sufficiently degrading without the lower depth of the places where couples are received. The classes frequenting these lodging-houses are most in need, and, as yet, are entirely unprovided for by any of the dwellings' companies, though a new company in process of formation proposes to deal with them. Being quite unable to provide for themselves, they naturally fall into the hands of unscrupulous speculators who are not embarrassed by sanitary or moral considerations, and think all is done when the proper regulations have been complied with. Great difficulties will attend the effort to improve these lodging-houses, and yet the attempt must be successfully made before any real progress in health and morals can be hoped for in the lowest stratum of the population.

As closely connected with the subject under consideration, the question of sub-letting may, perhaps, be here appropriately adverted to. On this, as hinted in a previous paper, authorities are antagonistic. Sir S. Waterlow and others, who house the best class of working men, allow their tenants to rent more rooms than they can occupy, and to sublet them to other tenants on their own terms. Those associations, on the other hand, which provide for poorer tenants, and not merely collect rents from them, but give them a certain amount of friendly supervision and help, which cannot be afforded by a paid professional collector, strongly object to subletting. They find it sufficiently difficult, with the most careful inquiry into the character of new tenants, and with constant supervision of those of longer standing, to keep all decent and orderly, and observe that whenever they relax their attention idle and vicious tenants find their way in directly. With a higher class of tenants the risk in allowing subletting is reduced, but it is clearly a thing to be avoided where possible. Where the buildings are large and the tenants numerous, its working is less likely to be successful than where they are fewer and better known. All tenants should be directly responsible to the collector, and the bond between them should be something stronger than the mere paying and receiving of so many shillings per week.

Where there are two rooms to a tenement, a somewhat smaller size of room may be adopted than is needed for a single room tenement, though it is very desirable, whenever the funds will allow it, to keep all the rooms large. The size of rooms must vary with, and be regulated by, the cost of building, that is to say, a half-crown room in a locality where building is cheap will be larger than in a locality where building is costly; but, in each case, it should be made as large as the half-crown per week rental will allow. This is a simple matter of calculation which may be gone into in a future paper. Though one of the two rooms may be called sitting-room and the other bed-room, both will most probably be used as sleeping rooms at night, while either one or both may have to do duty as living or work rooms during the day. The appliances and fittings must be distributed accordingly, and in planning each room a suitable position must be reserved for the bed, which should not be against an external wall. One room may without inconvenience open out of another without any intervening passage, and if it is unavoidable for the day room to be reached from the other, the tenants will not as a rule object to the arrangement, though any one unaccustomed to this class of dwelling might anticipate complaints from them on the score of its inconvenience. Though not an arrangement to be chosen, it may be used in cases of necessity. The fittings of a two-roomed tenement consist of a small cooking range in the day room, with mantelshelf over fireplace, a coal bin or locker to contain a hundred of coals, a dwarf cupboard about 3 ft. long and 14 in. deep, and, in the bedroom, a similar cupboard, a small fireplace and mantelshelf. A few pegs for clothes form a very desirable addition, and if a narrow rail be carried round the walls at about 6 in. below the ceiling to receive the nails for pictures (which the poorest tenants are very fond of hanging), the plaster of the walls will be saved from a great deal of damage. To secure through ventilation it is best to make the two rooms front and back, with an intermediate door of communication, but with no other opening in the partition wall dividing the two rooms. A ledged door furnished with a strong thumb latch will best fill this opening, and may have an iron button to fasten it from the bedroom side. Architraves and architrave-mouldings may be altogether dispensed with by making the edges of the linings flush with the face of the plaster on each side, and by running a groove round them. The window frames may be similarly treated internally with advantage.

The three-roomed tenement is often simply a living room, as above described, with two bedrooms opening directly out of it, without intermediate passages, one bedroom being usually larger than the other; but it sometimes takes the form of the two-roomed tenement with a scullery or washhouse added. In this case, much additional comfort is gained by the inmates, since all the cleaning, the preparations for cooking, and sometimes even the cooking itself, can be done in this additional apartment, thus leaving the other rooms free for living and sleeping rooms. When a common laundry does not form a part of the accommodation provided, a small copper is a useful adjunct to the scullery. In many of the Waterlow buildings the cooking stove is placed in the scullery also; but this plan is open to the objection that, as the family will prefer to sit in the room where there is a fire, at any rate in the cold weather, there will be a tendency for them to crowd into the scullery and make that a sitting-room, rather than to light a second fire. It seems preferable to use the scullery as a means of removing as much as possible the disagreeables of household operations into a separate apartment. When there are more than two rooms, and sometimes when there are only two, a love of neatness and order will often show itself. One room will be specially furnished and set apart for occasional use, while the other rooms are constantly occupied. Many rooms are very prettily decorated by their tenants, and very cheerful effects produced with very inexpensive materials. Window gardening, too, will add great charms to almost any room, and has this double advantage, that it is at once an external and an internal decoration. By means of a cross shelf or two, or by strings supporting climbing plants, whole windows are sometimes covered with a mass of flowers which serve as a blind, and moderate the light and sunshine.

In planning tenements with more than three rooms the arrangements approximate to those of a small house, where the kitchen is the ordinary living room, and a best sitting-room or parlour is kept for

occasional use only. All rooms may communicate with the kitchen direct, but the best room should, if possible, be entered without passing through any other room. A small entrance hall or passage is also highly approved by tenants of a better class.

It is very important at the outset to ascertain what class of dwelling is most needed in a particular locality, and to meet the demand as fully as possible. By a careful examination of the surrounding neighbourhood, and by ascertaining whether the rooms are let singly, or of what number of rooms the tenement consists, and at what price they are let per week, a fairly good estimate may be formed of the kind of accommodation needed, and the prices it may be expected to realise. It is to be remembered that, while the lowest class are somewhat more difficult to manage than the classes above them, they are more in need of healthy homes than any other, and pay higher rents in proportion for their rooms. If, therefore, there is any probability of the management being efficient, a large proportion of tenements of the lowest class should always find place in any scheme for building industrial dwellings.

A DICTIONARY OF SANITARY APPLIANCES.

By W. EASSIE, C.E.

AIR.—XXXIII.

BEFORE supplementing any of my former chapters with the latest inventions affecting the question of inlets and outlets of air, I am desirous of putting on record sundry experiments on the movements of gases, which will shew the necessity of proper inlets for the thorough cleansing of pipes from contained foul atmospheres. These experiments were made in May 1861, by Professor Wanklyn, who was at that time Demonstrator of Chemistry in the University of Edinburgh, and he has kindly lent me his working notes, made at the time, for my present purpose.

Professor Wanklyn has shown that if a tube, closed at the top and open at the *bottom*, be filled with a gas heavier than air, the former will not very rapidly descend, as might be supposed. For instance, a tube .57 inches in diameter, 9.2 inches in length, and with a capacity of 2.25 cubic inches, was filled with carbonic acid, and allowed to remain, with its mouth open and pointed downwards, for the space of five seconds. When this time had elapsed, the contents of the tube were analysed, in order to see how much carbonic acid had escaped, and the result of three experiments was as follows:—

	Experiment No. 1.	Experiment No. 2.	Experiment No. 3.
Air	26.3	20.3	26.6
Carbonic Acid	73.7	79.7	73.4
	100.0	100.0	100.0

These experiments were made on the day [illegible] the exposure being twenty seconds, with the same tubes; the results were as follows:—

	Experiment No. 1.	Experiment No. 2.	Experiment No. 3.
Air	49.67	60.68	51.34
Carbonic Acid	50.33	39.32	48.66
	100.00	100.00	100.00

It will be observed that some difference exists between the volumes of gas which escaped during the same spaces of time in all the foregoing experiments, filled with the dry gas, and this he says is doubtless accounted for by the action of the currents of air—variable in extent and direction—which are produced by the act of unclosing the tube. The above experiments prove that in five seconds three-fourths of the introduced gas cannot have fallen more than 2.40 inches in vertical distance. The cause of this retardation is not, the Professor thinks, due to any friction between the carbonic acid and the air which enters to supply its place within the tube, for notwithstanding the absence of cohesion in gases, the carbonic acid in these experiments seems very much in the condition of water in the two arms of an equal-armed syphon, the difference between the two cases being that whilst the cohesion between the particles of water hinders all possible movement, the want of this cohesion in the gas permits a movement which takes place with remarkable slowness.

From the course of experiments followed by the Professor, he was led to expect that carbonic acid should not escape more rapidly from the tube when its mouth is pointed downwards than when turned upwards, and when in actual experiment the escape was more rapid with the mouth turned downwards than when turned upwards, disproved the reasoning, because it is impossible to open a tube without creating a current. A current once set up, the gas moves in a body, and the descent of a quarter-volume of the gas is no proof that if the tube could be opened without creating a current a higher rate of egress would follow than there takes place when simple diffusion acts.

It is evident from the Professor's papers that it is the upward current of air which retards the passage of gas, and to prove this he took a tube, .343 inches in diameter, and 9.5 inches in length, provided with ground glass plates, so as to close the tube at both ends, fixing the top plate with tallow, so as to make it to consist, so to speak, of a single piece. Into this tube carbonic acid was then introduced, and the charged tube was then closed with the other ground glass plate. The top plate was then taken off, and the bottom one subsequently removed, and replaced after a lapse of five seconds; the top was then put on and taken back to the mercurial trough, and when the gas was passed into a graduated tube and carefully examined it consisted of almost pure air, which clearly proves that it is the upward current which produces the remarkable retardation.

During the experiments which he carried out about the same time, the Professor was able to prove that if a gas lighter than atmospheric air be introduced into a cylindrical vessel which is closed below, but open at the top, its contents do not rapidly escape upwards. For instance, a tube of the same size as the one used during the first six experiments already given was filled with moist hydrogen, and exposed for five seconds with the open end pointed upwards. The residual gas after this experiment was found to contain:—

Air	38.8
Hydrogen	61.2
	100.0

which goes to prove that the same causes operate as in the instances with carbonic acid.

It is interesting to note that the loss of carbonic acid becomes greater when a wide tube is experimented with. For example, a tube 1.5 inches in

diameter, 9.2 inches in length, and with a capacity of 5.65 cubic inches, was filled with carbonic acid, and the residua, after an exposure of five seconds in the way previously described, was found to consist of:—

	Experiment No. 1.	Experiment No. 2.
Air	43.4	52.5
Carbonic Acid	56.6	47.5
	100.0	100.0

In a further experiment, but with an exposure of ten-and-a-half seconds, the residue consisted of:—

Air	76.1
Carbonic Acid	23.9
	100.0

The extra loss of carbonic acid with the larger tube is explained by the greater current which was produced in the act of unclosing the larger tube.

Further experiments were made with a mixed gas produced by heating oxalic acid with sulphuric acid, collected over mercury in two tubes, care being taken that exactly similar gas got into either tube (a few bubbles of gas first into one tube and then into the other). The contents of one tube were reserved for analysis, and gave:—

Carbonic Acid	50.62
Carbonic Oxide	49.38
	100.00

This mixed gas was exposed with its open mouth downwards for sixty seconds, whereupon it was discovered that the product contained:—

Carbonic Acid	17.91
Carbonic Oxide	18.94
Air	63.15
	100.00

The above experiment proving that little or no change had taken place in relative proportions of the two gases; which goes to prove—adds the Professor—that the exit of gas *en masse* is due to currents, and is not molecular.

It is my intention shortly to make some experiments with simple and mixed gases, in tubes of three and four inches diameter, and the results will doubtless throw a great light upon the action of gases in upright soil-pipes and horizontal drain-pipes.

The Duke of Devonshire has obtained the Gold Medal from the Royal Agricultural Society (Ireland) for his cottages in the county Cork, which, in the opinion of the judges, combine comfort, accommodation, and economy in a remarkable manner, being not only the best but the cheapest in the competition. All the materials used in building them were obtained from the estate, and the cost has been found to be £90 7s. 6d. each without offices, or £100 4s. 6d. each with offices. Mr. Smith Barry has obtained the Gold Medal for second-class cottages.

Attention has been drawn by the *Ironmonger* to the danger which attends the use of many of the so-called tinned goods, saucepans, etc., sold by even the largest ironmongers. Analysis of the material with which some of these are 'tinned' shows 63.81 per cent. of lead. Hence it becomes necessary, after giving a high price for goods, to have this lining taken off, then really tinned with tin to prevent lead poisoning.

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SANITARY RECORD.
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The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

SANITARY INSPECTION OF DWELLINGS.

WITHIN the last few months the Society of Arts have formed a section for the discussion of Sanitary subjects, and very recently meetings have been held for inquiring into the general state of suburban and country residences as regards their sanitary arrangements.

With this view Messrs. W. Eassie, Rogers Field, and other gentlemen who have made themselves specialists in the subject, by long exclusive devotion to it—have been examined by the Committee, and their evidence, which coincides remarkably, is as follows:—

With regard to houses of the Metropolis of old construction, both Mr. Eassie and Mr. Rogers Field agree that they are in a very bad condition, the drains being almost invariably laid underneath the house, and from Mr. Eassie's experience 60 per cent. of these are constructed of brick, and average 18 inches in diameter. These drains are usually by no means watertight, but allow the sewage to percolate the ground in the vicinity, thus causing a reservoir of foul air under the house, which is drawn up through the floor by the heated air of the dwellings. In addition to this it is very usual to find under the basement of a house, an old cesspool, sometimes two or three, full of soil, but covered over so as to be hidden from sight. The cesspools, as a rule, have no overflows, and in more than one instance, Mr. Eassie has come to the conclusion that it was intended for the liquid to escape into the soil, and the solids only to be retained. He has also noticed that when rats have made their inroad into the basement of a house, brick drains are almost certain to be found, the rats breeding underneath the floors.

In these old residences, the closets are generally very improperly situated—in the centre of the house, on the landing of the stairs, or even in the bedrooms themselves; the closets, moreover, are of a dangerous pattern and very often badly ventilated. The soil pipes from these closets are usually inside the house, often very leaky, and jointed in the most slovenly manner, with red lead and putty, sometimes even with rag bandages. The soil pipes are never, or very seldom ventilated, nor are the drains themselves, and the foul sewer air gains access to the house by these faulty joints, and by means of the waste from sinks, cisterns, and baths, which are very seldom found dis-

connected, and generally run into the soil pipe direct, or into the D trap of the W.C. Mr. Eassie mentions that he finds the cisterns mostly made of wood, lined with lead, with overflows, as before-mentioned, into the soil pipes, and ventilating the drain into the cistern room. Fully 80 per cent. of these cisterns he finds supply both closets and housemaid sinks, from which drinking water is drawn for bedroom decanters.

The houses of recent construction are in very much the same plight as those of more ancient date mentioned above, but are in somewhat better condition, owing to the substitution of stoneware pipes for the large brick drains, and the absence of the cesspools. The drains, however, are frequently very badly laid, and leak at the joints, which are made often of clay, the clay sometimes falling out and thus permitting an escape of drain gas into the house. These drains are often also laid with very little fall, and become sewers of deposit. The foul air arising from these faulty drains, Mr. Field says, permeates the house in all kinds of unexpected places by means of rat runs, and he has frequently found foul smells in portions of a house where there were no drains at all, due to leaky drains in quite remote positions.

Another cause of the escape of sewer gas into the house is found in the bell traps placed in the line of drain for the purpose of washing down the floors. These, Mr. Field says, are a constant source of danger, as the water in the traps generally evaporates, leaving practically untrapped openings. And even if the water in the trap does not evaporate, it becomes so saturated with sewage gases that it is constantly giving off foul emanations into the house.

The ventilation of the drain is very seldom practised at all, and when it is, is generally done in a very inefficient manner, by small pipes of ½ or ¾-inch diameter. The waste of cisterns, sinks, and baths usually deliver into the soil pipe as in the older houses.

In making an examination of the condition of a house, the methods employed by Messrs. Eassie, Field, and Griffith appear to be very similar. The first thing to be done is to ascertain whether the drains pass inside or outside the house, and by making trial holes at various places to see the nature of the pipe. In case the drain does pass inside the house, the next step is to test the soundness, which is done by stopping up the drain at its lower end, and filling it with water, and noting whether the water sinks or not, and if it does sink, at what rate; by this means an approximate idea of the leakiness of the pipe is arrived at. The test for deposit is next applied; this is done by flushing the drain from the closet, sink, etc., by pouring down a large quantity of water, and watching at the lower extremity of the drain and noting whether the water comes down thick and foul or otherwise—in the former case the drain is put down as one of deposit, in the latter as clear. If the time the above-mentioned flush of water takes to traverse the drain be noted, the velocity of the sewage in the pipe is determined. If the drain does not answer to the above tests satisfactorily, it is recommended to be taken up and relaid. The next step to be taken is to search for cesspools, if any are suspected. This can only be done by opening up the floors. Then follows the question, Is the house drain disconnected from the sewer? A strong draught up the drain generally answers the question in the negative, showing that there is no trap. In this case, where possible, put in a disconnecting chamber.

The next proceeding is to examine and test all the details of the sanitary arrangements, such as water-closets, sinks, bath, etc. The soil pipes are carefully examined by being filled with water, as mentioned before, in connection with the drain itself. If of iron with putty joints, this test may give way to the smoke test.

The water-closet apparatus is then examined, as to its pattern and general state of soundness, and the woodwork is taken down to see whether the safes and traps underneath have an overflow pipe, delivering into the soil pipe, as is too often the case. The cisterns which supply the closets are the next point of inquiry; these are examined and it is noted whether they supply drinking water as well as flushing water for the closets; their overflows are also noted, and it is ascertained whether they go into the drain direct or not. An examination of all other cisterns follows, and then the wastes of sinks, baths, and lavatories. Mr. Field mentions that a good way to trace these is to pour hot water down, and feel the pipe when heated. If a sink waste delivered into a soil pipe, for instance, this would be detected immediately by the heat of the latter. Mr. Eassie has furnished a description of the ordinary practice of examining houses in the *Practical Hygiene* of Dr. Parkes and Dr. De Chaumont.

The time taken in thus examining a house, differs of course according to the size of the house in question, and other causes, but on an average Mr. Field says it would take from three to four hours of his personal time, on the assumption that all had been previously prepared for his inspection, the concealed parts of the pipes, etc., having been exposed to view. Mr. Eassie says that when there is no drain plan of the house (and he always prepares one in this case whereon to mark the descending pipes) no commensurate report could be even roughly drafted under four hours. Mr. Griffith says he can form a very fair opinion of the sanitary arrangements of an ordinary house in about an hour and-a-half, but if a detailed report has to be prepared, the drain tested and the necessary items of work to be done in order to render the house in thorough sanitary condition set forth, it would take from a day and-a-half to two days, depending upon the size of the house.

As to the form, size, and inclination of house drains, the object appears to be to use as small a pipe as is capable of carrying away the required amount of

sewage. Messrs. Eassie and Field both agree that stoneware pipes should be used of four inches diameter where these can perform the work, where they will not a six-inch can be used, and rarely a nine-inch. Mr. Griffith uses cast iron pipes in the house.

The fall for a house drain should not be less than one in thirty, or one in forty in most cases, where automatic flushing arrangements are not used. With a flushing tank, Mr. Field says he has worked drains very satisfactorily with a fall of one in a hundred or even one in two hundred. Mr. Eassie agrees that this self-acting flushing tank is of immense advantage in cases where a proper fall cannot be got. In order to be able to insure the proper working of the drains when newly laid down, everything is made perfectly accessible, manholes are placed at bends in the drain, screw access plates are provided to all traps under sinks, etc., and all down pipes are either not encased or the casing is made easily removable. The seats of the closet are made to hinge so as to be easily lifted.

The Committee asked the engineers also about the condition of country houses. These appear to be arranged in a similar manner to the Metropolitan dwellings, as regards drainage, except that cesspools are more prevalent in the country, and the drinking water is frequently derived from wells in proximity to these cesspools. Public institutions, such as hospitals, schools, asylums, etc., are in the same state generally as the private houses.

As to the question of the disposal of the sewage of detached mansions or institutions, the three engineers examined appear to agree that the best method of disposal is to place the sewage on the land. Mr. Field and Mr. Eassie try to abolish all cesspools as a rule, and intercept the solid matter by means of a strainer. The intercepted solid matter is removed daily and mixed with dry earth, the liquid flows into one of the self-acting syphon tanks, and is then discharged in a body, intermittingly, on to the land. Mr. Field also distributes the sewage by means of sub-irrigation drains occasionally, especially in cottage gardens where surface irrigation is inapplicable. This system, he says, has been very successful. In case of sub-irrigation it is indispensable to have the solid part of the sewage separated from the liquid. Mr. Field also says that sub-irrigation has been carried on with great success in America, with his flushing tank; the village of Lennox being drained in this way. However, Mr. Field prefers surface to sub-irrigation where there is suitable land in an unobjectionable position. Mr. Griffith very frequently uses an osier bed upon which to discharge the sewage.

Mr. Eassie and Mr. Field agree that the greatest impediment in the way of constructing new houses upon sound sanitary principles is the general ignorance on the subject amongst architects and builders, and the absence of non-enforcement of proper bye-laws regulating the details of house drainage. Mr. Eassie thinks, too, that a great deal may be attributed to the want of special knowledge on the part of many clerks of the works, who, provided the work be soundly executed, seldom concern themselves about the principle upon which it is based. Something, too, may be put down to the disinclination of the landlord or occupier to go to the necessary expense of a perfect system of drainage.

Beside the above intelligence communicated by Messrs. Eassie, Field, and Griffith, Mr. Edward Monson, Assoc. Inst. C.E., has given some valuable information to the Committee.

The above evidence, which is merely a summary of the chief points, was printed and in the hands of members on the occasion of the meeting on the 12th June, and at the conclusion of the sitting the resolution printed at page 469, SANITARY RECORD, June 15, was finally carried, after some opposition from several present, who persisted in considering the scheme as one which would not work.

THE SALE OF POISONS.

IT is no part of our present purpose to discuss the merits or demerits of those great co-operative societies which, in London in particular, are making such tremendous inroads into the profits of the retail trader. A decision, however, has been given by the Court of Appeal, which deserves some notice at our hands.

In the case of the Pharmaceutical Society of Great Britain *v.* the London and Provincial Association, the facts seem to have been as follows:—The defendants are a co-operative body, carrying on trade very much as the Civil Service Society in the Haymarket or the Army or Navy Society in Victoria Street. In that capacity they had been in the habit of selling drugs; and the question was, whether they had done so illegally, having regard to the 'Pharmacy Act, 1868'. That Act requires that persons selling, compounding, or dispensing poisons shall be duly qualified and licensed, and imposes a penalty on any person acting without a license. In regard to traders keeping open a shop for sale, although the person actually selling is to be liable, the person in whose behalf the shop is kept is to be deemed the seller. In the case under notice the Association had no license for itself in its corporate capacity, but kept duly qualified and licensed assistants to sell its drugs; and it was for a sale by one of these assistants that proceedings were instituted.

The decision of the magistrate was, that the Association was within the Act, and he inflicted the penalty. This decision was upheld in the Queen's Bench Division, and the Association thereupon further appealed to the Court of Appeal, which reversed the two previous decisions, and held that the Association was exempt. A good deal seemed to turn on the meaning and use of the word 'person'. *Prima facie*, it does not include corporations, and they ought not to be held to be included unless there were very strong grounds for doing so to be collected

from the Act. Lord Justice Bramwell thought that so far from this being the case, everything tended to the contrary. The offences defined by the Act were (except as to the keeping open of a shop) such as from their nature could hardly be committed by a corporation, and could only be personally committed by individuals. The individual who sold drugs and poisons, if unqualified and unlicensed, could always be got at; and if he did so, it will be no defence for him to show that he acted as a servant, whether for an individual or corporation. An act which was unlawful in itself, was none the less so because done by a servant; and if the Act were lawful because the servant who sold was qualified and registered, then this view of the statute would be more reasonable. No doubt, for keeping a shop open for such sales the directors might in peculiar cases be liable; for they in fact did keep it open for the purpose. The advantage of the construction thus adopted was, that it did not exclude corporations from carrying on their business, nor prevent the public from dealing with them, and so was not in restraint of trade. The foregoing train of argument is derived from Lord Justice Bramwell's judgment. It cannot be said to be particularly luminous. Lord Justice Baggallay was much more clear. He took his stand on a very simple point. After having examined the Act, he appears to have treated it as specially designed to prevent the dispensing or compounding of poisons or drugs by unqualified persons. A corporation cannot itself dispense or compound, except by an agent or servant. If such agent was duly qualified, as in the case under consideration, the object of the Act was fully attained, especially as the corporation would be expressly liable if it kept open a shop for sales by unlicensed deputies.

It seems impossible to doubt the common sense interpretation of the law as laid down by Lord Justice Baggallay, and we have not heard of there being any intention on the part of the Society representing the chemists to appeal to the House of Lords, so the judgment against them will stand.

NOTES OF THE MONTH.

THE LONDON WATER SUPPLY.

In his annual report on the metropolitan water supply, just issued, Lieutenant-Colonel Bolton, the water examiner appointed under the Metropolitan Water Act, 1871, remarks that a unification of the metropolitan water supply would ensure a better supply, both as to quantity and quality, at cheaper rates; it would ensure the introduction of a constant service at an earlier date, and at a cheaper cost of alteration and adaptation of fittings; it would effect an immediate saving of half a million by rendering the proposed new works unnecessary, and would utilise in districts requiring extensions the spare power existing in other districts by the redistribution of several districts into zones of levels; the supply would be better regulated, waste prevented and controlled, and saving effected in pumping and other distributory expenses; it would also enable the metropolis generally to be better protected from fire, and afford local authorities greater facilities for carrying out sanitay arrangements.

THE SUNDAY-SCHOOL CENTENARY.

A correspondent in the North calls our attention to the inadvisability of continuing these aggregations of children in the face of the very extensive prevalence of scarlet fever and measles in many places, particularly in Durham and in most of the colliery villages. He informs us that a serious type of the former disease is very common, and that it has spread so rapidly that, amongst various methods for staying the spread of infection, the advisability of closing the schools for a month or two has been suggested.

TALMUDICAL NECESSITIES.

As showing the singularly advanced state of opinion amongst the Jewish nation in Rabbinical times, the following passage from the Talmud (Tractat Sanhedrim, 17, B.) may be interesting to our readers: 'No wise man will reside in a city which does not possess an efficient magistracy, a properly managed system of poor rates, provisions for public worship, public baths, adequate drainage, a physician, a surgeon, a scribe, a teacher for children, and the means for securing a proper supply of food.'

PREVALENCE OF ITCH IN THE NORTH.

Mr. Culley, Inspector of the Local Government Board, has recently drawn the attention of the Darlington Board of Guardians to the serious spread of this disease in the district, propagated by casual paupers, by whom it was disseminated broadcast throughout the country. He knew of one Union that had at least twenty cases under treatment in a week. The evil arose greatly from the bad condition of some lodging-houses. It, however, could not be too generally known that Boards of Guardians had power to detain anyone found suffering under infectious disease till cured, and he trusted Unions would more frequently avail themselves of their authority, as, like all infectious disease, the evil was rarely confined to the place where it originated.

LIGHTING ROOMS.

M. Javal, in a paper on public and private lighting, considered from the aspect of ocular Hygiene (*Revue Scientifique*, October 18, 1879, p. 361), treats of artificial lighting. He says, that a chandelier, carrying a million of wax lights, would not give an amount of light equal to sunlight. Even in a room, lit up in an unusually brilliant manner, the pupils are much more dilated than in full daylight; and this dilation explains the fatigue to the eyes produced by artificial light. Therefore, there is never too much in fact never enough, artificial light, and prejudices, without any just foundation, are prevalent on this point. M. Javal recommends to persons suffering from certain optic defects, and who cannot work in the evening, two large lamps, which would obviate the fatigue of reading. Artificial light, also, excepting the electric and magnesium lights, contain much fewer chemical rays than daylight. All artificial spectra are very dull on the most refracted side; the chemical rays, the violets and the blues, there

show a very low intensity. M. Bouchardat (*Revue Scientifique*, August 16, 1879, p. 148) has shown the dangers of violet and deep violet rays, on the authority of M. Regnauld's important work on the fluorescence of the media of the eye. The conclusion to be derived is that the flame-light being poorer in chemical rays than sunlight, should be preferred by workers. In fact, M. Javal quotes the instance of a member of the Institute, whose fatigued vision would scarcely tolerate daylight, and who shut his shutters, and lighted his lamp, in order to work. M. Javal recommended him rather to work in daylight, with yellow spectacles, to destroy the chemical rays. Artificial light, on the other hand, considerably dilates the pupil, and renders the chromatism of the eye more sensitive, which is the reason that the light of day is to be preferred. The electric light is injurious, in a certain point of view; it contains a large quantity of chemical rays, which it would be easy to neutralise by giving a yellow tint to the globes. Nevertheless, neither the public, nor the experts, have complained, up to the present time, of the electric light; inconveniences only arise when the eyes are fixed for too long a time on a too powerful electric light. It is therefore advisable not to look too long at electric lights, and when this becomes a habit, the opacity of the globes now in use can be diminished. In fine, all our systems of artificial light are insufficient; there is, then, no necessity to fear excess of light, since, on the contrary, artificial light is less penetrating than daylight. Gas, therefore, does not destroy the eyesight, it is the wavering and flickering of the flame, when there is neither globe nor chimney, which fatigues the sight; gaslight, with a burner protected by a globe, is excellent for it. M. Javal may well, then, say, with dying Göethe—'Light, more light!'

THE SUPPOSED POISONING CASE AT WELBECK.

The district around Welbeck has been thrown into the greatest consternation and panic by the occurrence of several deaths, and at least sixty cases of severe illness, amongst persons who had attended a sale at Welbeck, which commenced on the 13th of June, and lasted five days. Refreshments were provided by a Mrs. White, of the Swan Inn, Mansfield, consisting of beef-steak pies, ham-sandwiches, bread and cheese. Almost directly after the sale many persons who partook of the sandwiches were taken ill, and four of them have died. The symptoms observed during this illness were great abdominal pains, vomiting, purging, and most profuse perspiration, it being stated in one case that the perspiration rolled from the sufferer literally in streams. Drs. O'Connor and Lloyd, of Worksop, are of opinion that the disease which killed one of the victims, on whom they attended, was English cholera, and their opinion is corroborated by Dr. Bartolomé, of Sheffield, whom they called in consultation. A *post mortem* examination has been ordered in the case of Mr. Wilkinson, the first person who died in this mysterious way, and the viscera have been sent to an analytical chemist, in order if possible to discover the cause of death. The same course has been adopted in the case of a woman who died in the same way and from the same cause. Mr. Wills, the Medical Officer of Health for the Mansfield Rural Sanitary Authority, has some pieces of the ham used in making the sandwiches in his possession, and found nothing wrong with them; he has reported the death of the woman, to whom we have already referred, to the Local Government Board as a case of English cholera. In this case the jury found that death was caused by English cholera, but that such cholera was caused by eating impure or bad food. There is an impression in the district that these deaths were caused by trichinosis, but up to the present time there is little if any warrant for such a conclusion. It is to be hoped that the scientific investigation into these cases will be conducted in an accurate and exhaustive manner; and it is of the greatest importance, both in the interests of pathology and of sanitary science, that the truth should be arrived at. For these purposes something besides the examination of the viscera is needful. The muscles and tissues, both of the victims and of the impugned food, should undergo a careful microscopical examination, if trichinosis be supposed to be instrumental in this wide-spread mortality and sickness.

NEW PRECIPITATION PROCESSES.

The prize offered by the King of Saxony for the best practical scheme for rendering harmless to fish in rivers and lakes the refuse from factories and sewage of towns has brought before the public two precipitation processes, among others, in which lime is the chief agent. One of these schemes is that of Herr Wilhelm Knauer, in which the sewage is heated and then saturated with lime-water, and precipitation being thus effected, the water enters another tank with chlorate of magnesia, and is ultimately filtered through gravel and earth. In Brigadier-General W. Heine's process, the water, also sufficiently saturated with slaked lime, has to pass through several tanks and canals until it is pumped up to a tower, from which it descends in the form of rain, the sulphuric steam with which the interior of the tower is filled occasioning a crust of ammonia on the walls. This plan, it is said, is now being tried, under the authority of the Saxon Minister of the Interior, on the Elster, a river very much polluted by various factories on the Saxon frontier. The objections urged against these processes are that lime has a tendency hurtful to fish life, and leaves an offensive and worthless deposit, while the effluent water, being in an alkaline condition, is liable to putrefaction upon its introduction into the river. The effluent from the A B C process, as carried out at Aylesbury, with the help of sulphate of alumina, is acid, and, therefore, not open to the same objection as the alkaline processes, while the deposit forms a valuable and inoffensive manure.

MEAT BREAD.

M. Scheurer-Kestner has discovered the remarkable fact that the fermentation of bread causes the complete digestion of meat. He found that a beef steak cut into four pieces, and mixed with flour and yeast, disappeared entirely during the process of purification, its nutritive principles becoming incorporated with the bread. The meat would also appear capable of preservation for an indefinite period in its new state, for loaves of meat bread made in 1873 have been submitted to the French Academy of Science, when not a trace of worms or mouldiness was observable. At the beginning of his experiments, M. Scheurer-Kestner used raw meat, three parts of which, finely minced, he mixed with five parts of flour and the same quantity of yeast. Sufficient water was added to make the dough, which in due time began to ferment. After two or three hours, the meat had disappeared, an

the bread was baked in the ordinary manner. Thus prepared, the meat-bread had a disagreeable, sour taste, which was avoided by cooking the meat for an hour with sufficient water to afterwards moisten the flour. The meat must be carefully deprived of fat, and only have sufficient salt to bring out the flavour, as salt, by absorbing moisture from the air, would tend to spoil the bread. A part of the beef may be replaced with advantage by salt lard, which is found to improve the flavour. The proportion of meat to flour should not exceed one half, so as to insure complete digestion. Bread made with a suitable proportion of veal is said to furnish excellent soup for the sick and wounded.

RECREATION GROUNDS.

Two recreation grounds are to be formed respectively at Winlaton and at Blaydon. At the former place the pleasure ground will be four-and-a-half acres in extent, and will be leased by the Local Board at an annual rental of £4 per acre. The Blaydon ground, covering in all six acres and a quarter, has been secured for £20 per year. The want of open spaces for recreative purposes is one that is beginning to be sadly felt in a great many Northern manufacturing towns, and the action taken by the Board in this matter will no doubt be heartily approved by the inhabitants of both places. The Board have added the *utile* to the *dulce*, and, in addition to the recreative aspect of the undertaking, intend to have a certain number of props erected in the grounds, so that a portion of each place may be utilised by the good wives of the district for clothes-drying purposes. We presume that this portion of the ground will be in some way screened off from the ornamental portion, otherwise we cannot regard this very practical step with great favour, being of opinion that it is well to dry as well as to *laver sa linge sale en famille*, rather than in a recreation ground.

THE CONTAGIOUSNESS OF TYPHOID FEVER.

In his report on the Hackney district for 1878, Dr. Tripe records his belief in the contagiousness of typhoid fever, 'although not in so great a degree as scarlet fever'. He cites the following cases, which occurred in 1878, as illustrations of his position:—The father of a family, after a short illness, showed decided symptoms of enteric fever on September 4th 1878, and was nursed at home by his wife and eldest daughter. After an illness of six weeks he became convalescent, but shortly after suffered from a relapse. A few days after his first convalescence his eldest daughter was attacked, then his wife, and subsequently the other children, the last showing premonitory symptoms on November 6th. All except the father were removed to the Fever Hospital, at Homerton, as soon as the early symptoms set in, and the bedding, etc., was disinfected. There was another family in the house, not one of whom contracted the disease. There was also a marked exemption as regards a child who was taken away by its grandfather on September 9th, and who was not attacked, being the only member of the family who did not suffer from the disease. There was also a decided instance of infection by milk, where the inmates of two institutions, one in Hackney and the other not, were attacked simultaneously with the disease. They were both supplied by the same milkman, who had the disease in his house. On making a strict enquiry into this case, Dr. Tripe ascertained that the person in charge of the sick had on one occasion, about a fortnight before the disease appeared, measured out the milk sent to these institutions, having left the sick room for that purpose.

We may add to this account the statement that the contagiousness of enteric fever is becoming to be more generally believed in than before. A lengthy argument in favour of this view will be found in papers contributed to the *British Medical Journal*, in the early part of last year, by Dr. Alexander Collie, Medical Superintendent of the Homerton Fever Hospital, whose exceptional experience entitles his opinion to very great weight. Dr. Collie has also published in a separate form some observations on the contagion of enteric fever, translated from the French of the late M. Piedvache, of Dinan. These certainly go to prove that the disease is communicable by close personal intercourse with the sick, probably through the medium of their recent stools. They appear to show that the enteric patient produces something which injects something not contained in ordinary filth, and that the disease is therefore specific. This is now, probably, everywhere admitted. But what the specific morbid product is, is not so clear; and Dr. Collie has rendered considerable service by drawing attention to cases, and the facts contained in the papers which he has now published.

CERTIFICATES OF HEALTHWORTHINESS OF HOUSES.

In the *Builder* of January 31st last attention was drawn to the serious escape of sewer gas at No. 66, Holland Park, whereby the late Mr. Serjeant Parry and his wife met their deaths. During the present week this residence has been put up for sale, and annexed to the particulars and conditions of sale we notice a certificate from Mr. Rogers Field to the effect that the drainage and other sanitary arrangements have been re-constructed according to his designs and under his supervision, and are now in perfect order. We hail this sign of the times with cordial satisfaction, and if all auctioneers would follow this useful lead we should hear less of malconstruction. It is customary enough for engineers to hand their clients some such certificate with the final plan of the drains, and these documents are of great assistance when the owners of houses are desirous of letting their houses for a season. There can be no doubt whatever that a certificate of this order imparts a great value to the premises about to be sold or let, and it has been on several occasions adopted in the case of country hotels. If, also, a small committee of engineering experts were sent out to the chief places of resort upon the continent with a view of reporting as to those best equipped in sanitary matters in the cases of newly built pensions and hotels, the good work which we have indicated would be indefinitely extended. We say new buildings of this kind, because it is certain that old buildings, wheresoever they may be situated, cannot be justly certificated without a thorough exploration underneath the floors of every room.

SMALL-POX SPREAD BY AN AMBULANCE.

A curious instance of the infection of small-pox being spread by means of an ambulance is recorded in the last annual report of Dr. Armistead to the Saffron Walden Town Council. Only one case of small-pox occurred in the borough during the year, the subject being a married woman aged 40. According to Dr. Armistead, the only source of infection possible was a little boy living next door, who, whilst

playing in the road, jumped on the back of the ambulance in use at the Infectious Diseases Hospital as it was returning to the coach house after conveying to the hospital eight cases of small-pox from a parish in the rural district. The boy had been well vaccinated, but the woman who took the disease had never been vaccinated, and was therefore so much the more susceptible to contagion. She began with the disease on the twenty-third day after the boy jumped on the ambulance, so that Dr. Armistead thinks it probable that the way in which the contagion was conveyed was thus: The boy, after exposure to what would be rather a strong dose of contagion, being himself well protected by vaccination, showed no symptoms of the disease, although he may have actually received the contagion into his system in a modified form, and passed through the usual period of incubation before he communicated the disease to his neighbour. Or it is possible that the contagion, without affecting the boy at all, might have been conveyed in his jacket. The members of the boy's own family were all fortunately well protected by vaccination, and therefore escaped; and he probably would not have conveyed the disease to any one had he not come in contact with one who had no protection whatever from vaccination. There is much that is plausible in this explanation, but the mode in which the case is accounted for seems to us a little roundabout. Is Dr. Armistead sure that he can properly exclude the possibility of the contagion reaching the woman in a more direct manner?

PREVENTION OF SCARLATINA FATALITY.

MR. B. CLARKE, M.R.C.S., writes to us to draw attention to the value of dilute sulphuric acid as a remedy for scarlatina. He suggests that as there is no danger in taking it in such small doses (one or two tablespoonfuls every four hours) as he recommends, the trial of its efficacy should be made, so that scarlatina may become as trivial a complaint as it is stated to be in warm climates. This, as our correspondent must know, is more a medical than a sanitary matter; but we give the hint in the hope that it may be of service in checking the lamentable mortality that annually occurs from this too lightly regarded disease.

NINE CASES OF TYPHOID IN A FAMILY.

MR. ALLEN, Medical Officer of Health for the Belper division of the Belper Rural District, records the abnormally large number of nine cases of typhoid fever in a single family. The fever broke out in the house of one of the gamekeepers in the service of Lord Scarsdale, and it attacked in succession nine of the family, including the man himself. Mr. Allen thinks the cause was, beyond doubt, the foul gases emanating from a large, stinking cesspool, which received the soil from some privies and refuse of all kinds. The cesspool was disinfected and closed, and the disease did not extend. Happily none of these nine cases seem to have had a fatal termination.

TYPHOID FEVER AND POLLUTED WATER.

IN the American *Popular Science Monthly* for February 1879, Dr. Ely Van De Warker, of Syracuse, N. Y., under the title 'Typhoid Fever Poison', reports seventeen cases of the fever in an isolated suburb of the city, in which there were but fourteen houses. The first case was imported thence through the overflowing of the privy in which all the excrement of the patient had been thrown. A well became contaminated; all the persons who were taken ill used this well. It was the constant or occasional source of supply of seven of the fourteen families. No cases occurred in the households who did not drink from this well. Some cases were developed in every family who drew water from it. The families who escaped were exposed to every other influence but that of this particular well; their own water supply was the same, less the privy contamination. Dr. Thomas F. Rochester, of Buffalo, N. Y., who quotes this case in his address on Practical Medicine to the American Medical Association at Atalanta, thinks that it is not unlikely that the wells of the families who escaped received some of the overflow from their own vaults, but as these were free from typhoid poison, no ill results ensued.

A NEW DISINFECTING STOVE.

Dr. Rushton, in his report for the year 1879 of the sanitary state of the rural district of the Macclesfield Union, gives a description of a new disinfecting stove, invented by Mr. Farrow of Leek. He writes: 'Disinfection is a term which conveys different meanings. To some it implies the means taken to purify the air; to others, substances which act chemically upon putrescent matter, to restrain decomposition; but for our present consideration it signifies the means taken to destroy the specific poisons of infectious diseases. In my report of 1876 I brought before your notice a disinfecting stove, suggested by Dr. Ransom, of Nottingham, for dealing with infected bedding, blankets, pillows, carpets, and personal clothing, all of which had to be taken and deposited in the stove, to be disinfected by heat. This, of course, involved a good deal of labour, also some danger of spreading the infection during transit on the highway, the infected houses having to be dealt with during the time that the moveable articles are being disinfected at the place appointed to receive them. The one I now commend to your notice possesses the following advantages: Its comparative nominal cost; its portability, easily taken to the infected place; its non-liability to get out of order; its easy management, and its thorough efficiency. It is composed entirely of iron, in three separate pieces; the first piece is 19 in. in circumference, and in appearance has the form of an inverted breakfast-plate; from this basement plate arise two columns, which unite at the top to form a convenient handle for carriage; between these columns the second piece of the apparatus is placed, being kept *in situ* by the ridge cast in the basement plate for that purpose. This second piece is a thick, heavy, cup-like casting; from the centre of the base arises a loop for the purpose of receiving a hook to carry the cup by when it is heated, preparatory to its being used. The upper margin of this cup is grooved internally for the reception of the third and last piece, which is a casting of 5 in. high, 3½ in. in diameter, and divided by a diaphragm at about three-fourths of its height. This diaphragm forms the base of the reservoir for the carbolic acid, and has a very fine aperture in its centre to allow the acid to pass through very slowly, *guttatim* (as in the very old and well-known principle of the sand-glass), upon the almost red-hot thick cup below. The space underneath this reservoir is quickly filled with the acid vapour, which passes through apertures of about the

size that would admit the end of a common pencil. This vapour chamber is thought to be very necessary by the inventor, in order to prevent the admission of atmospheric air to the hot metal, at the point where the vapour is generated, for fear of its taking fire. Dr. Sansom has shown (in *The Antiseptic*, by A. E. Sansom, M.D., 1871) the amount of carbolic acid that is taken up by the air at different temperatures. Dr. Langstaff, also (*Hospital Hygiene*, by Chas. Langstaff, M.D.), in the following year invented a trough containing flannel wetted with a solution of carbolic acid and water. Vaporisers have been invented—Savory and Moore's, for example; but what I wish to do here is, to thank Mr. Farrow, of Leek, very sincerely for giving me the privilege of using his invention, and also for taking the trouble to superintend the manufacture of one for the use of this Authority. He informs me, so far as my memory serves, that he seldom uses any other means to disinfect articles of clothing and dwellings; that he has never known a single instance of a case of infectious disease being traceable to such clothing or dwellings after they had been purified by this method. He also mentioned the following experiment related to him by a gentleman distinguished in sanitary science, whose name I do not, I am sorry to say, now remember. This gentleman placed two pieces of black cloth upon the bed of a person undergoing desquamation after scarlet fever. He shook the sheets over the pieces of cloth, and on examining them with a magnifying glass found them covered with fine, white, shining particles of epidermis. He exposed one of those pieces of cloth to the vapour of carbolic acid, the other piece being protected by a tightly fitting glass-shade. After a time the two pieces were examined with the aid of the same magnifying glass, when the particles of epidermis upon the exposed piece of cloth were found to be of a very brown colour, and shrivelled up—in short, destroyed by the chemical action of the acid. In the second piece, which had been protected by the glass-shade, there was not any perceptible alteration. It may be asked, what is the effect of this potent agent upon articles of furniture, window and bed curtains; how do the colours in the patterns of carpets come off? and what about valuable oil paintings, how do they fare by such treatment? There need not be any anxiety about the articles named in these questions, since it will not injure any one of them, with two exceptions—the first is, a very recently painted picture may fade somewhat by the action of the acid upon it; but any one that has been painted a sufficient length of time to harden, will not be affected in any way whatsoever. The second is, that bright iron and steel—such as cutlery—is soon affected by it, therefore should not be long exposed to its influence. Wardrobes, chests, drawers, etc., need not be emptied of their contents for disinfection, since the vapour will penetrate into the recesses where it is possible for the infection to have made its way. If we open the tick of a bed, it may contain wool, feathers, or any other material, and plunge our hand into the very centre of it, bring out a handful of its contents, we find that it will smell very strongly of the disinfectant. The first use we made of this apparatus was in a weaver's house, which was infected with the poison of scarlatina. In this house were two looms containing silk of various colours, which were bright and delicate in appearance, and in full working order when the fever broke out. These silk goods did not seem to have taken any harm from an exposure to the vapour of four hours' duration. Since that time we have frequently disinfected private houses, and also public schools in our district, and, for the present, without any trace of the infection being left behind.'

THE PUBLIC HEALTH

DURING JUNE 1880.

THE mean temperature during June at the Royal Observatory, Greenwich, was 57°.5, and exceeded by 0°.7 the average for the corresponding month in 100 years; an excess of temperature prevailed on nine days of the month, whereas on 21 days it was below the average. The warmest day was Thursday, the 29th, when the mean temperature was 66.7, and exceeded the average by 4°.9; the coldest day was Friday the 4th, when it was only 49.1, and showed a deficiency of 9°.1. Rain was measured on twenty days during the month at Greenwich, to the aggregate amount of 2.3 inches, showing an excess of 0.3 of an inch upon the average June rainfall in 61 years; rain fell on more days last month than in any month since August of last year. The sun was above the horizon during 494.5 hours of the month, but only 132.5 hours of bright sunshine were recorded, which were less by 60.3 hours than those recorded in May, and below the amount registered in any June since 1877. South-westerly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, containing an estimated population of about seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 26,584 births and 13,707 deaths were registered during the five weeks ending July 3rd. The births were equal to an annual rate of 37.0 per 1000 of the estimated population in the twenty towns; the birth-rate was equal to 35.8 in London, and was 2.3 below the rate in the aggregate of the nineteen provincial towns. The deaths registered in the five weeks of June were equal to an annual rate of 19.1 per 1,000, showing a further decline from the rates in the four preceding months, which had been 29.0, 22.3, 21.9, and 20.7 respectively. The June death-rates in these twenty towns in 1877, 1878, and 1879 were equal to 21-4, 21.3, and 19.3 per 1000 respectively. The health of our large towns during last month, judged by their mortality statistics, again compares very favourably with that prevailing in the corresponding periods of recent years.

The lowest annual rate of mortality during June in the twenty towns was 14.6 per 1000 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follows:—Portsmouth, 14.7; Bradford, 16.4; Birmingham, 17.0; Plymouth, 17.7; Leicester, 18.2; London, 18.3; Leeds, 18.5; Hull, 18.5; Wolverhampton, 18.5; Bristol, 18.8; Newcastle-upon-Tyne, 19.3; Sheffield, 19.5; Salford, 20.0; Nottingham, 20·6; Norwich, 21.5; Sunderland, 21.7; Oldham, 22.0; Manchester, 22.2; and the highest rate during the month, 25.4 in the city of Liverpool. In the nineteen large provincial towns, which have an aggregate population somewhat greater than that of London, the annual death-rate during June averaged 19.8, whereas in London the rate was but 18.3. The death-rates last month in Brighton, Bradford, Plymouth, Manchester, and Salford showed a marked decline from those recorded during May.

The 13,707 deaths from all causes in the twenty towns included 2144 which were referred to the seven

principal zymotic diseases; 596 resulted from scarlet fever, 542 from whooping-cough, 353 from measles, 346 from diarrhœa, 187 from fever (principally enteric), 67 from diphtheria, and 53 from small-pox. These 2144 deaths were equal to an annual rate of 3.0 per 1000 in the twenty towns during the five weeks under notice, against 3.3, 3.1, and 3.0 in the three preceding months. The zymotic rate in the nineteen provincial towns was equal to 3.1 per 1000, while in London it was but 2.8. The annual death-rate from these diseases during June did not exceed 1.3 and 1.6 in Leeds and Brighton, whereas it ranged upwards in the other towns to 4.6 in Salford, 4.9 in Liverpool, 6.2 in Norwich, and 6.6 in Sunderland. Scarlet fever was the most fatal zymotic disease during June; it caused 286 deaths in London, and 310 in the nineteen provincial towns, among which this disease showed the largest fatality in Norwich, Salford, Sunderland, Sheffield, and Bristol. Of the 542 deaths from whooping-cough in the twenty towns, 245 were returned in London, and 297 in the nineteen provincial towns; the proportional fatality was greatest in Liverpool, Bristol, Manchester, and Salford. The remarkable epidemic of measles in Plymouth has now nearly disappeared; only 16 deaths resulted from this disease last month, against 73 and 53 in April and May. The fatal cases of diarrhœa, owing to the higher temperature, showed a considerable increase upon those in the preceding month. Of the 187 deaths referred to fever, 72 were returned in London, while 115 were recorded in the nineteen other towns; the greatest fatality of fever (almost exclusively enteric) occurred in Sheffield, where 23 cases were returned. The 67 deaths referred to diphtheria included 43 in London, while in the nineteen provincial towns only 24 resulted from this disease. Small-pox caused 51 more deaths in London, one in Manchester, and one in Bradford, whereas no death from this disease was registered in any of the seventeen other provincial towns. The Metropolitan Asylum Hospitals contained 216 patients at the end of June, against numbers increasing from 163 to 218 at the end of the four preceding months. The weekly number of new cases of small-pox admitted to these hospitals, which had been 39 and 46 in the two previous months, declined during June to 41. Judged by these hospital returns, the fatality of small-pox in London showed a slight decline during last month.

The fatality of diseases of the respiratory organs showed a further considerable decline during June. The weekly number of deaths referred to these diseases in London, which had averaged 350, 317, and 254 in the three preceding weeks, did not exceed 194 during June, and were equal to an annual rate of but 2.8 per 1,000. The death-rate from lung diseases showed the usual wide variations in the different towns for which this information is contributed; it ranged from 2.0 in Portsmouth, 2.7 in Newcastle-upon-Tyne, and 2.8 in London, Birmingham, and Sunderland, to 5.0 in Liverpool, 5.8 in Oldham, and 6.6 in Manchester.

In the outer ring of suburban districts around London (having a population of little less than a million) the annual death-rate from all causes during June did not exceed 13.9, and the zymotic rate was but 1.9 per 1,000. In inner, or registration London the corresponding rates were, as before stated, 18.3 and 2.8 per 1,000 respectively.

The number of urban sanitary districts for which we are able to publish uniform mortality statistics in the accompanying table is 182. In the corresponding tables for the eleven preceding months, the numbers of contributing sanitary districts has steadily increased from 36 to 181. On the last day of June 214 post-cards were sent out to the Medical Officers of Health of as many urban sanitary districts, including 32 new applications. No less than 182 of these cards have been returned, and the statistical information furnished thereon is herewith published. The estimated population of the 182 sanitary districts, for which we publish June statistics in the accompanying table, is rather more than seven millions of persons; and if we include London and its outer ring of suburban districts, it would amount to nearly twelve millions. The annual birth-rate in those districts furnishing this information averaged 37.7 per 1,000, against 38.5 and 36.5 in the months of April and May. Although a monthly return of births in small districts has little value for comparative purposes, it may be noted that the annual birth-rate during May was exceptionally low, and under 24 per 1,000, in Lytham, Carnarvon, Driffield, Teignmouth, Ipswich, Trowbridge, and Guildford. On the other hand, it was unusually high (exceeding 55 per 1,000) in Cowpen, Mexborough, Fenton, Rotherham, Goole, Ilkeston, Fleetwood, Walker-on-Tyne, and Workington. It is probable that the population of some of these last-mentioned urban sanitary districts is underestimated.

The annual death-rate during June averaged 18.9 per 1,000 of the estimated population in the 182 urban sanitary districts, showing a further considerable decline from the rates in the three preceding months, which had been 21.8, 21.6, and 21.6 respectively. In the twenty large towns, including London, the average death-rate during last month, as before stated, was 19.1 per 1,000; the rate, therefore, in the smaller urban districts must have been considerably lower than that which prevailed in the larger towns. The annual death-rates during June were exceptionally low, and under 12 per 1,000, in Abingdon, Weymouth, Beccles, Workington, Dawlish, Littlehampton, Lytham, Romsey, Ryde, Failsworth, Cambridge, Reigate, Rowley Regis, Stroud, Tiverton, Haslingden, Horwich, Hinckley, Rusholme, Dover, Banbury, Maidenhead, and Bromley (Kent). In the cases of Cambridge, Rusholme, Banbury and Bromley (Kent), very low death-rates have been maintained for several consecutive months. Excessive death-rates, exceeding 30 per 1000, were recorded during June in Liversedge, Carnarvon, Droitwich and Crompton.

The annual death-rate from the seven principal zymotic diseases averaged 2.6 per 1000 in the 182 sanitary districts, against 2.7 and 2.8 in the two preceding months; in the twenty towns the death-rate from these diseases averaged 3.0 per 1000, and corresponded with the rate in the previous month. In 37 of the 182 sanitary districts no death was referred to any of these seven zymotic diseases; the zymotic death-rate, however, showed a marked excess in Altrincham, Bootle-cum-Linacre, Norwich, Sunderland, Leigh, Carnarvon, and Audenshaw. Small-pox caused one death in Bradford (Yorks) and one in Manchester, and not one in any other of the sanitary districts. The fatal cases of measles were proportionally excesssive in Acton, Carnarvon, Devonport, Swansea, and Torquay. Scarlet fever was fatally prevalent in Altrincham, Audenshaw, Bradford (Yorks), Burton-upon-Trent, Gorton, Leigh, and Norwich. Whooping-cough caused 9 deaths in Bootle and 12 in Cardiff. The deaths referr[illegible] fever, principally enteric, much exceeded the a[illegible] in Morley, Mexborough, Ramsgate, Sheffield Bromwich, and Widnes; the general mortali[illegible]

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JUNE 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	**3,664,149**	**12,578**	**9416**	1441	1169	*	*	*	1341	999	51	149	286	43	245	72	153	978	730	257	1286	**35.8**	**18.8**	**2.8**	**2.8**	
ABINGDON	6,033	19	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	38.3	2.0	0.0	0.0	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Ewart.
ACTON‡	14,000	66	29	13	6	1	..	4	6	7	..	6	..	..	..	1	..	4	..	1	..	49.2	21.6	5.2	3.0	T. Francis.
ALTRINCHAM	12,000	25	18	1	1	1	..	6	3	6	..	..	6	..	..	..	..	2	2	..	..	25.4	18.3	6.1	2.0	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	115	60	12	14	3	3	19	9	9	..	3	2	..	2	2	..	8	10	..	8	41.9	21.8	3.3	2.9	W. H. Hughes.
ASTON MANOR	52,821	169	63	11	16	3	1	14	18	8	..	2	1	1	3	1	..	16	1	..	..	38.9	14.5	1.8	3.7	H. May.
AUDENSHAW	6,000	21	13	4	5	3	..	1	..	4	..	1	3	..	..	..	..	1	1	..	..	42.6	26.4	8.1	2.0	R. Slater.
BANBURY	13,500	*	13	2	..	1	..	4	6	1	..	..	..	..	..	..	1	1	2	..	..	*	11.7	0.9	0.9	R. Grimbly.
BANGOR†..	7,835	*	15	3	2	1	1	*	2	1	..	..	..	..	..	1	..	1	*	1	..	*	25.0	1.7	1.7	H. Rees.
BARNSLEY	30,000	107	51	16	13	*	*	*	10	8	..	..	3	..	3	..	2	6	6	5	11	43.4	20.7	3.2	2.4	M. T. Sadler, M.D.Lond.
BARROW-IN-FURNESS	40,000	160	54	14	18	2	8	4	8	6	..	..	..	..	4	..	2	14	6	1	..	48.7	16.4	1.8	4.3	J. Settle.
BATH‡	53,649	127	94	11	14	6	*	23	35	4	..	..	1	1	1	1	..	12	10	3	15	24.7	18.3	0.8	2.3	A. B. Brabazon, M.D.
BATLEY	29,851	86	43	*	*	*	*	*	*	3	..	..	..	..	..	..	..	3	12	4	1	35.0	17.5	1.2	4.9	W. Bayldon.
BECCLES	5,000	10	2	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	24.3	4.9	0.0	0.0	E. B. Crowfoot, M.B.
BILSTON‡	25,000	90	43	15	7	3	1	11	6	13	..	2	4	..	3	2	2	10	2	..	..	37.5	17.9	5.4	4.2	W. M. Hancox.
BINGLEY	9,000	26	15	3	3	..	3	4	2	1	..	..	..	..	1	..	..	2	2	..	..	35.1	20.3	1.4	2.7	J. W. Craig, M.D.
BIRMINGHAM‡	394,738	1575	645	190	112	23	29	172	119	82	..	5	13	4	25	11	24	105	58	27	76	41.6	17.0	2.2	2.8	A. Hill, M.D.
BISLEY	5,264	12	6	4	1	..	..	1	..	2	..	..	..	..	2	..	..	..	..	..	..	27.7	13.9	4.6	0.0	T. Partridge.
BOLTON†..	106,500	315	151	40	37	9	6	39	20	22	..	6	9	..	4	..	3	34	8	4	1	38.6	18.5	2.7	4.2	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	55	15	19	5	2	12	2	14	..	1	4	..	9	..	..	14	2	5	4	*	25.3	6.4	6.4	R. J. Sprakeling.
BOSTON†	15,000	48	16	3	1	1	..	3	8	1	..	..	..	1	..	..	..	..	3	5	4	42.7	13.9	0.9	2.6	W. Clegg.
BRADFORD (LANC.)†	15,000	53	27	10	8	..	1	*	3	2	..	..	2	..	..	..	..	*	1	1	..	46.0	23.5	1.7	7.0	J. Hudson.
BRADFORD (YORKS.)‡	197,196	678	310	75	*	*	*	*	38	53	1	5	22	..	12	4	9	*	6	25	35.9	16.4	2.8	*	H. Butterfield.
BRAINTREE	5,000	*	5	4	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	*	12.2	0.0	0.0	J. Harrison.
BRENTFORD	11,557	42	19	7	2	..	..	9	1	4	..	..	..	..	4	..	..	2	2	1	..	44.2	20.0	4.2	2.1	J. Williams.
BRIDGNORTH	6,000	14	8	..	4	..	..	1	3	1	..	..	..	..	..	1	..	3	..	..	..	28.4	16.0	2.0	6.1	A. Mathias.
BRIDGWATER	13,000	46	23	4	2	2	2	7	6	1	..	1	..	..	..	..	..	..	2	..	3	43.1	21.5	0.9	0.0	F. J. C. Parsons.
BRIDPORT	8,145	20	9	1	1	..	1	3	3	..	..	..	..	..	..	..	..	3	1	..	2	29.9	13.5	0.0	4.5	G. M. Evans.
BRIGHTON‡	107,321	333	150	28	*	*	*	*	41	16	..	..	6	..	6	1	3	*	*	1	25	32.4	14.6	1.6	*	R. P. B. Taaffe, M.D.
BRISTOL‡	213,536	685	384	79	*	*	*	*	81	47	..	11	23	..	16	2	5	*	*	14	60	33.5	18.8	2.3	*	C. L. Baylis, M.D.
BROMLEY (KENT)	14,293	*	14	4	1	..	2	3	4	1	..	..	1	..	..	..	..	..	3	..	..	*	11.9	0.9	0.0	C. O. Baylis, M.D.
BROMSGROVE	6,967	27	12	3	1	..	1	1	6	..	..	..	..	..	..	..	..	1	..	..	2	47.1	20.9	0.0	1.7	C. Carey.
BURNLEY‡	56,000	*	105	34	17	7	5	31	11	18	..	6	5	1	5	..	1	26	11	..	..	*	19.6	3.4	4.8	T. Dean, M.D.
BURSLEM	29,159	111	35	10	9	2	..	10	4	4	..	..	1	..	2	..	1	6	2	1	..	46.3	14.6	1.7	2.5	J. M. Taylor.
BURTON-UPON-TRENT	33,000	124	48	9	9	*	*	*	9	9	..	..	9	..	..	..	..	6	3	4	5	45.7	17.7	3.3	2.2	C. Perks.
BURY†	50,000	163	69	17	10	*	*	*	14	6	..	1	1	..	3	..	1	12	7	..	5	42.5	18.0	1.6	3.1	H. Ashworth.
BURY ST. EDMUNDS	15,600	51	28	8	1	1	2	5	11	3	..	2	..	1	..	..	..	6	2	2	5	39.8	21.8	2.3	2.3	F. W. Clarke.
CAMBORNE	15,000	*	26	5	3	2	5	6	5	3	..	..	1	..	2	..	..	6	3	1	..	*	21.1	2.4	4.6	E. S. Angove.
CAMBRIDGE	34,500	87	27	3	8	2	..	10	4	6	..	2	..	..	4	..	..	2	6	..	2	30.7	9.5	2.1	0.7	B. Annington, M.D.
CANTERBURY	20,962	53	25	6	3	..	..	7	8	2	..	..	2	..	..	..	..	5	3	..	3	30.8	14.5	1.2	2.9	F. Wacher.
CARDIFF	82,364	246	137	42	31	6	6	34	18	20	..	3	1	..	12	1	3	31	13	8	12	36.3	20.2	3.0	4.6	H. J. Paine, M.D.
CARLISLE‡	35,000	109	40	8	8	3	1	10	10	4	..	..	3	..	..	..	1	9	5	..	7	40.6	14.9	1.5	3.4	R. Elliot, M.D.
CARNARVON	10,407	19	27	6	10	3	1	3	4	7	..	7	..	..	..	..	..	4	4	2	..	22.2	31.6	8.2	4.7	H. Rees.
CHELMSFORD	9,700	30	12	1	..	1	2	5	3	..	..	..	..	..	..	..	..	1	4	..	3	37.7	15.1	0.0	1.3	E. H. Carter.
CHELTENHAM‡	45,000	118	70	13	8	1	3	21	24	5	..	5	..	..	..	..	..	12	5	3	..	27.3	16.2	1.2	2.8	T. Wright, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JUNE 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Chiswick	12,000	47	24	7	5	1	2	5	4	5	..	..	..	..	3	..	2	2	2	1	..	47.7	24.3	5.1	2.0	F. C. Dodsworth.
Cirencester	7,000	*	15	5	..	1	2	2	5	..	..	..	..	..	..	..	..	6	2	..	..	*	26.1	0.0	10.4	F. T. Bond, M.D.
Cockermouth	5,550	12	6	1	..	..	..	1	4	..	..	..	..	..	..	..	..	1	..	..	2	26.3	13.2	0.0	2.2	J. Ward, M.D.
Colchester	28,924	92	58	8	7	5	6	15	17	8	..	..	6	..	..	1	1	..	10	6	2	7	38.7	24.4	3.4	4.2	E. Waylen.
Congleton†	12,000	34	14	6	1	2	..	..	5	1	..	..	..	..	1	..	..	1	..	1	..	36.9	15.2	1.1	1.1	P. M. Davidson.
Consett†	7,757	22	11	4	4	..	..	2	1	1	..	1	..	..	..	..	..	2	1	..	..	37.0	18.5	1.7	3.4	W. M. Renton, M.D.
Coseley‡	23,000	77	39	15	6	1	1	8	7	4	..	1	..	..	3	..	..	9	3	3	..	34.9	17.7	1.8	4.1	J. Eagleton.
Coventry‡	41,000	134	77	22	13	3	7	10	22	6	..	..	2	..	2	..	2	13	8	1	10	34.1	19.6	1.5	3.3	M. A. Fenton, M.D.
Cowpen	5,000	23	9	1	2	..	1	2	3	2	..	..	..	..	1	1	..	1	1	1	..	56.0	21.9	4.9	2.4	H. D. Ward, M.D.
Crompton†	8,500	29	23	4	8	..	4	6	1	3	..	1	1	..	..	1	..	3	2	2	..	44.5	35.3	4.6	4.6	W. Brooke, M.D.
Croydon..	70,000	255	82	24	13	4	1	15	25	13	..	7	2	1	2	1	..	7	5	2	13	44.3	14.3	2.3	1.2	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	*	2	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	*	6.3	0.0	0.0	L. Armstrong.
Derby†	80,385	241	97	16	14	3	8	34	22	9	..	6	1	1	..	..	1	14	15	5	8	39.1	15.7	1.5	2.3	W. Iliffe.
Devonport‡	50,000	142	83	16	22	5	3	20	17	19	..	17	..	1	1	..	..	10	8	3	11	29.6	17.3	4.0	2.1	J. May, jun.
Dorchester	7,500	23	12	2	3	..	2	2	3	..	..	..	..	..	..	..	..	2	2	..	2	37.3	19.5	0.0	3.2	E. J. Day.
Dover	33,636	99	32	5	3	1	1	10	12	1	..	..	..	..	..	1	..	6	3	4	7	35.8	11.6	0.4	2.2	M. K. Robinson, M.D.
Droitwich‡	3,600	10	11	3	2	1	..	1	4	2	..	..	..	..	..	1	1	..	..	..	1	29.0	31.9	5.8	0.0	H. Swete, M.D.
Droylsden	8,000	20	11	7	1	1	..	1	1	1	..	..	..	..	1	..	..	2	1	..	..	30.4	16.7	1.5	3.0	R. Slater.
Eastbourne	18,000	*	22	4	4	2	..	7	5	5	..	3	..	1	..	1	..	2	1	..	1	*	14.9	3.4	1.4	E. F. Fussell, M.B.
East Dereham	5,791	13	6	2	1	1	..	1	1	2	..	..	1	..	..	..	1	..	1	..	..	27.3	12.6	4.2	0.0	H. B. Vincent.
Epsom	7,550	*	8	1	1	1	1	2	2	..	..	..	..	..	..	..	..	2	1	..	..	*	12.9	..	3.2	E. L. Jacob.
Evesham	5,000	*	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1	..	..	..	*	4.9	0.0	2.4	G. H. Fosbroke, jun., S.Sc. C. Cam.
Failsworth	8,000	*	6	1	2	..	..	1	2	1	..	1	..	..	..	..	..	..	..	..	..	*	9.1	1.5	0.0	G. W. Beattie, M.D.
Farnham	5,000	14	10	..	1	1	..	2	6	..	..	..	..	..	..	..	..	4	..	1	1	34.1	24.3	0.0	9.7	S. G. Sloman, Jun.
Fenton	14,000	66	25	14	4	1	2	1	3	1	..	..	..	1	..	..	..	4	4	..	..	57.3	21.7	0.9	3.5	A. V. Griffiths.
Finchley	11,339	37	15	4	1	3	..	3	4	4	..	..	3	..	..	..	1	2	1	..	1	39.7	16.1	4.3	2.1	J. Turle, M.D.
Fleetwood	5,000	29	10	4	2	1	..	1	2	1	..	..	..	..	..	..	..	1	..	..	..	70.6	24.3	0.0	2.4	J. Porter.
Garston†	8,500	27	13	6	3	1	..	2	1	4	..	2	..	..	2	..	..	2	1	..	..	41.4	19.9	6.1	3.1	J. A. Fisher.
Glossop	18,697	65	38	8	7	3	2	10	8	6	..	1	4	..	..	1	..	5	6	1	..	42.3	24.7	3.9	3.3	J. Rhodes.
Gloucester	37,907	117	53	12	8	1	3	18	11	2	..	1	..	..	..	..	1	6	4	..	9	37.5	17.0	0.6	1.9	J. P. Wilton.
Goole	10,205	51	18	4	3	..	1	8	2	4	..	..	..	..	1	2	3	..	..	4	60.8	21.5	4.8	3.6	J. Mitchell Wilson, M.B., S.Sc.C.
Gorton†	32,000	119	41	10	10	3	2	11	5	9	..	..	7	..	1	1	..	4	5	..	..	48.5	16.7	3.7	1.6	R. E. Hammond.
Great Driffield	6,033	11	7	2	2	..	..	2	1	2	..	1	1	..	..	..	..	1	..	..	..	22.2	14.1	4.0	2.0	D. Ridpath, M.D.
Guildford	10,167	20	11	2	..	..	2	4	3	1	..	..	..	..	1	..	..	1	2	..	..	23.9	13.2	1.2	1.2	J. Morton, M.D.
Halifax†	72,000	215	122	32	14	*	*	4	25	7	..	..	2	1	..	3	1	18	13	3	14	38.9	22.1	1.3	3.3	D. Ainley.
Harborne	6,000	12	6	1	1	..	..	1	3	..	..	..	..	..	..	..	..	2	..	..	2	24.3	12.2	0.0	4.1	R. W. Smith, M.D.
Harwich‡	7,100	30	15	6	..	1	1	7	..	1	..	..	..	..	..	..	1	3	4	..	..	44.1	22.0	1.5	4.4	A. K. Morgan.
Haslingden‡	14,000	44	15	5	2	2	1	2	3	4	..	..	2	..	..	1	1	4	..	..	..	32.8	11.2	3.0	3.0	J. A. Harrison, M.D.
Heywood	23,000	*	31	7	3	1	1	9	10	1	..	1	..	..	..	..	..	4	6	..	..	*	16.4	0.5	2.1	H. Wisken.
Hinckley	7,500	30	7	2	..	..	..	1	4	..	..	..	..	..	..	..	..	..	..	..	2	48.7	11.4	0.0	0.0	W. H. Griffiths.
Hindley	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Horwich	4,315	9	4	2	1	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	25.4	11.3	0.0	2.8	G. H. Whitaker.
Huddersfield‡	81,780	215	159	31	39	10	8	42	29	21	..	11	2	..	3	1	4	32	20	2	11	27.4	20.3	2.7	4.1	J. S. Cameron, M.D., B.Sc.
Hull‡	149,627	578	265	53	*	*	*	*	66	38	..	10	7	2	4	3	12	*	*	7	29	40.3	18.5	2.6	*	J. F. Holden.
Hurst	6,500	22	11	2	3	1	1	2	2	1	..	..	..	..	..	1	..	1	2	..	..	41.2	20.6	1.9	1.9	T. Cooke.
Hyde	28,125	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
Ilfracombe	5,500	15	8	..	..	..	..	3	5	..	..	..	..	..	..	..	..	2	1	..	..	33.2	17.7	0.0	4.4	E. J. Slade-King, M.D., S.Sc.C.
Ilkeston†	12,356	59	21	7	6	..	..	6	2	1	..	1	..	..	..	..	..	7	2	..	..	62.2	22.2	1.1	7.4	R. Wood.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JUNE 1880—(*Continued.*)

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Ipswich	48,001	93	60	5	6	5	3	18	23	1	..	..	..	1	..	..	..	6	9	..	11	23.6	15.2	0.3	1.5	G. S. Elliston.
Keighley	24,000	101	40	8	7	..	4	13	8	3	..	..	1	..	1	1	..	6	4	..	5	51.2	20.3	1.5	3.0	A. Roberts.
Leamington	24,500	69	30	5	5	4	1	5	10	5	..	..	5	..	..	..	..	3	3	1	1	34.3	14.9	2.5	1.5	J. S. Baly.
Leeds†	318,929	902	453	89	63	*	*	*	87	31	..	3	7	3	2	7	9	78	51	30	..	36.9	18.5	1.3	3.2	G. Goldie.
Leek	12,527	47	18	5	1	2	*	1	7	2	..	1	..	..	..	1	..	3	*	..	2	45.6	17.5	1.9	2.9	J. J. Ritchie.
Leicester‡	129,912	464	226	69	*	*	*	*	45	27	..	12	4	3	1	2	5	*	*	7	31	37.3	18.2	2.2	*	W. Johnston, M.D.
Leigh	20,400	73	49	16	14	..	5	8	6	12	..	4	7	..	..	..	1	4	3	2	..	43.5	29.2	7.2	2.4	J. Hall.
Lichfield	8,129	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. A. Carter, M.D.
Lincoln	32,103	125	63	14	9	3	7	18	12	4	..	1	..	..	2	..	1	11	10	1	10	47.4	23.9	1.5	4.2	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,000	8	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24.3	6.1	0.0	0.0	C. Kelly, M.D.
Liverpool‡	544,056	2182	1327	324	309	64	62	381	187	255	—	31	38	3	122	23	38	259	131	64	210	41.8	25.4	4.9	5.0	J. S. Taylor, M.D.
Liversedge	13,750	42	35	10	9	3	1	7	5	4	..	1	..	..	1	..	2	4	4	..	..	37.2	31.0	3.5	3.5	W. J. Sykes, M.D.
Luton	24,200	81	29	12	4	..	..	7	6	4	..	..	..	..	1	..	3	2	3	..	2	40.7	14.6	2.0	1.0	H. Sworder.
Lytham	5,000	9	3	1	..	..	1	..	1	..	..	..	..	..	..	..	..	1	1	..	..	21.9	7.3	0.0	2.4	W. E. Pountney, M.B.
Macclesfield	36,641	109	70	14	7	1	1	30	17	3	—	..	..	..	..	..	3	18	8	2	10	36.2	23.2	1.0	6.0	G. Bland.
Maidenhead	8,281	21	8	1	1	..	2	1	3	..	..	..	..	..	..	..	..	2	1	..	..	30.9	11.7	0.0	2.9	W. T. G. Woodforde, M.D.
Maidstone†	29,537	70	34	7	2	3	1	10	11	3	..	1	..	1	..	..	1	2	1	..	4	30.9	15.0	1.3	0.9	M. A. Adams.
Manchester‡	363,130	1346	772	162	*	*	*	*	120	116	1	24	33	2	31	12	13	229	*	32	148	38.7	22.2	3.3	6.6	J. Leigh.
Merthyr Tydfil	52,000	150	100	17	12	4	7	37	23	6	..	4	..	..	..	2	..	27	7	..	4	33.0	21.9	1.3	5.9	T. J. Dyke.
Mexborough	6,000	28	7	1	2	2	..	1	1	3	..	..	..	..	..	2	1	..	1	..	..	56.8	14.2	6.1	0.0	W. Sykes.
Middlesbrough	58,988	194	78	25	15	7	4	18	9	10	..	2	5	1	..	2	..	13	6	1	3	40.0	16.1	2.1	2.7	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	46	29	7	6	1	1	8	6	2	..	..	2	..	..	..	..	3	3	3	..	33.5	21.1	1.5	2.2	T. B. Knott.
Morley	12,100	47	26	12	4	1	2	6	1	4	..	..	..	..	..	2	2	4	3	2	..	47.2	26.1	4.0	4.0	S. T. Steele, S.Sc.C.Camb.
Neath	12,000	30	21	4	6	1	..	7	3	4	..	—	4	..	..	..	..	7	4	..	3	30.4	21.3	4.1	7.1	G. Ryding, M.D.
Newark‡	13,746	50	23	6	4	1	..	4	8	2	..	1	..	..	..	..	1	2	2	..	1	37.9	17.5	1.5	1.5	A. Ashby, M.B.
Newbury	9,796	35	18	2	3	1	..	3	9	2	..	..	..	..	2	..	..	2	..	1	2	43.5	22.4	2.5	2.5	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	44	20	7	3	1	1	*	3	..	..	..	..	..	..	..	..	4	2	..	..	29.7	13.5	0.0	2.7	St. J. Edwards, M.D.
Newcastle-upon-Tyne‡	149,366	488	277	59	37	*	*	*	63	26	..	3	10	..	8	3	2	39	38	12	42	34.1	19.3	1.8	2.7	H. E. Armstrong.
Norwich‡	85,827	307	177	59	*	*	*	*	39	51	..	1	25	..	1	1	23	*	*	6	14	37.3	21.5	6.2	*	T. W. Crosse.
Nottingham	173,627	504	313	78	63	11	24	73	64	38	..	13	9	..	8	2	6	65	29	9	28	33.1	20.6	2.5	4.3	E. Seaton, M.D.
Nuneaton	7,400	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. Peacock.
Oldham†	115,413	312	195	44	45	19	13	54	20	27	..	13	6	2	3	2	1	51	29	3	18	35.2	22.0	3.0	5.8	J. M. Sutton, M.D.
Oxford	37,500	95	52	15	4	4	3	13	13	2	..	..	1	1	..	..	..	7	5	..	5	30.8	16.9	0.6	2.3	A. Winkfield.
Pembroke	15,000	35	24	8	2	2	..	4	8	..	..	..	..	..	..	..	..	7	3	..	..	28.4	19.5	0.0	5.7	D. P. Saer.
Penzance	12,000	26	16	3	1	2	1	3	6	1	..	..	..	..	..	1	..	1	1	..	..	26.4	16.2	1.0	1.0	G. B. Millett.
Peterborough‡	20,000	66	25	6	4	1	1	5	8	1	..	..	..	..	1	..	..	6	1	..	..	34.4	13.0	0.5	3.1	W. Thomson, M.D.
Plymouth‡	74,993	236	127	31	33	8	6	22	27	25	..	16	..	2	3	1	3	21	13	2	6	32.8	17.7	3.5	2.9	H. Greenway.
Poole	11,350	38	13	3	2	..	..	2	6	2	..	2	..	..	..	..	..	..	..	..	..	40.7	13.9	2.1	0.0	H. A. Lawton.
Portsmouth	134,224	357	162	44	23	6	6	46	37	21	..	8	..	..	3	3	7	22	18	1	13	32.4	14.7	1.9	2.0	G. Turner.
Preston†	88,000	316	176	53	34	16	8	37	28	21	..	..	12	1	1	1	6	23	43	5	2	46.8	26.1	3.1	3.4	H. O. Pilkington.
Ramsgate‡	22,200	57	35	6	3	1	2	10	13	5	..	..	..	..	2	2	1	3	4	1	1	26.8	16.4	2.3	1.4	R. Lyddon (Deputy).
Reading†	41,500	118	51	11	7	4	2	17	10	3	..	..	2	..	1	..	..	4	11	..	..	37.1	16.0	0.9	1.3	J. Shea, M.D.
Redditch	10,070	38	15	5	2	..	1	3	4	..	..	..	..	..	..	..	..	2	4	..	..	45.9	18.1	0.0	2.4	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	21	13	2	4	..	1	2	4	1	..	..	—	..	1	..	..	2	..	..	..	26.9	16.6	1.3	2.6	J. S. Hichens.
Reigate	18,000	36	14	3	..	..	..	2	9	2	..	..	—	..	1	..	1	1	1	—	..	24.3	9.5	1.4	0.7	E. L. Jacob.
Richmond (Surrey)	19,500	46	22	5	..	1	..	7	9	..	..	..	—	..	—	..	..	5	2	..	7	28.7	13.7	0.0	3.1	J. T. Rowland, M.D.
Rochdale	72,720	215	97	19	18	7	5	24	24	14	..	2	..	2	4	3	3	11	16	3	..	36.0	18.2	2.3	1.8	J. Henry, M.D.

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‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JUNE 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 Persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Rochester	18,500	51	28	7	6	..	1	9	5	4	..	..	..	..	3	..	1	4	5	1	5	33.5	18.4	2.6	2.6	J. Sladen-Knight, M.D.
Romsey	4,481	19	3	1	1	..	..	1	1	..	..	..	..	..	..	..	..	1	..	..	..	51.6	8.2	0.0	2.7	F. Buckell.
Rotherham	34,404	168	57	18	17	5	3	6	8	8	..	1	5	..	1	..	..	16	..	..	4	59.4	20.2	2.8	5.7	J. Hardwicke, M.D.
Rowley Regis	27,000	96	22	4	9	..	2	2	5	3	..	..	1	..	..	..	..	2	6	2	1	43.3	9.9	1.4	2.7	J. G. Beasley.
Rugby	8,916	31	10	..	..	..	2	3	5	1	..	..	..	..	..	..	..	1	4	..	..	42.9	13.8	1.4	5.5	G. Wilson, M.D.
Runcorn	14,000	56	23	6	8	2	..	9	3	1	..	..	..	..	..	1	..	5	2	..	..	48.7	20.0	0.9	4.3	R. H. Mouritz.
Rusholme†	12,500	37	11	2	2	1	1	5	..	1	..	..	1	..	..	..	..	1	..	..	..	38.6	11.5	1.0	1.0	J. Gregory.
Ryde	12,800	*	9	1	2	..	..	2	4	2	..	..	..	1	..	1	..	2	..	..	..	*	8.6	1.9	1.9	A. Platt Wilks, M.B.
Salford‡	185,786	719	357	84	91	28	17	96	41	82	..	11	38	2	18	5	8	74	48	14	31	40.4	20.0	4.6	4.2	J. Tatham, M.D., S.Sc.C.Camb.
Selby	5,720	17	8	3	..	..	..	4	1	..	..	..	..	..	..	..	..	2	1	..	1	36.2	17.0	0.0	4.3	J. Mitchell Wilson, M.B.
Sheffield†	304,938	880	456	91	94	*	*	**	82	72	..	1	33	1	11	18	8	106	28	7	44	37.6	19.5	3.1	4.5	T. W. Hime, B.A. M.B.
Sittingbourne†	9,000	30	9	3	2	1	..	2	1	..	..	..	..	..	..	..	..	1	..	..	..	43.5	13.0	0.0	1.4	H. G. Sutton.
Smethwick	21,000	83	31	17	3	..	..	4	7	4	..	2	..	..	..	..	2	..	..	..	..	48.1	18.0	2.3	0.0	W. Sutton.
Southport	34,100	73	51	11	5	4	2	11	18	3	..	2	..	..	1	..	..	6	5	2	4	26.0	18.2§	1.1	2.1	H. H. Vernon, M.D.
Stalybridge	23,405	75	52	14	10	3	2	13	10	5	..	3	..	..	1	..	1	20	08	..	..	39.0	27.0	2.6	10.4	F. J. Roberts-Dudley.
Stourbridge	9,376	29	9	3	1	..	..	1	4	..	..	..	..	..	..	..	..	1	..	1	..	37.6	11.7	0.0	1.3	G. H. Fosbroke, S. Sc. C. Camb.
Stratford-on-Avon	7,899	*	12	2	1	..	..	4	5	..	..	..	..	..	..	..	..	1	1	..	4	*	18.5	0.0	1.5	T. Partridge.
Stroud	7,608	19	7	..	..	..	..	6	1	..	..	..	..	..	..	..	..	1	..	..	4	30.4	11.2	0.0	1.6	H. J. Yeld, M.D.
Sunderland†	116,730	368	194	50	51	20	8	34	31	59	..	27	17	..	7	3	5	25	17	9	19	41.1	21.7	6.6	2.8	E. Davies.
Swansea	65,890	204	108	20	29	7	8	31	13	25	..	13	10	..	..	1	1	22	12	4	4	37.7	19.9	4.6	4.1	R. Eager, M.D
Tamworth	4,846	21	6	..	1	..	1	3	1	..	..	..	..	..	..	..	..	..	2	..	..	52.8	15.1	0.0	0.0	H. J. Fausset, M.D.
Taunton	16,227	40	19	7	2	..	1	5	4	..	..	..	..	..	..	..	..	3	4	..	3	30.0	14.2	0.0	2.2	H. J. Alford, M.D.
Teignmouth	7,000	13	8	1	..	..	..	3	4	..	..	..	..	..	..	..	..	..	..	..	..	22.6	13.9	0.0	0.0	W. C. Lake, M.D.
Tewkesbury	5,500	15	7	..	..	..	1	..	6	..	..	..	..	..	..	..	..	1	1	1	..	33.2	15.5	0.0	2.2	W. Allard.
Tiverton†	10,500	30	9	3	..	..	..	3	3	1	..	..	..	..	1	..	..	1	..	..	1	37.3	11.2	1.2	1.2	J. P. McNeill, M.D.
Torquay	26,000	*	43	10	15	4	2	5	7	12	..	11	1	..	..	..	..	10	4	..	..	*	20.1	5.6	4.7	P. Q. Karkeek.
Tottenham†	37,000	100	48	12	9	4	2	12	9	5	..	3	..	..	1	..	1	6	4	1	1	35.2	16.9	1.8	2.1	C. T. Conolly.
Toxteth Park	8,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. W. Pendleton.
Tredegar	18,000	50	26	2	3	2	2	8	9	1	..	..	..	..	1	..	..	7	1	2	4	33.8	17.6	0.7	4.7	G. A. Brown.
Trowbridge	12,000	23	12	1	2	1	2	1	5	1	..	..	1	..	..	..	..	2	2	..	..	23.3	12.2	1.0	2.0	G. C. Taylor, M.D.
Truro	11,049	30	14	1	1	2	2	4	4	1	..	..	..	..	1	..	..	5	1	1	3	33.0	15.4	1.1	5.5	E. Sharp.
Tunstall‡	15,500	64	24	10	5	2	..	2	5	2	..	..	..	..	1	1	..	6	..	..	..	43.1	16.2	1.3	4.0	J. P. Edwards.
Ulverston	11,000	25	11	1	3	..	..	3	4	1	..	1	..	..	..	..	..	2	..	..	3	27.7	12.2	1.1	2.2	A. Thompson, M.D.
Walker-on-Tyne	8,000	48	17	5	4	..	2	4	2	1	..	..	..	..	1	..	..	2	2	2	..	72.9	25.8	1.5	3.0	H. F. Hurst.
Wallasey	20,000	66	22	4	2	1	1	8	6	1	..	..	..	..	1	..	..	2	2	..	2	40.1	13.4	0.6	1.2	I. Byerley.
Warrington†	40,000	156	45	11	8	1	..	16	9	3	..	1	..	..	..	..	2	7	6	5	4	50.8	14.7	1.0	2.3	G. W. Joseph.
Wednesbury‡	26,000	102	35	12	8	6	..	7	2	9	..	..	8	..	..	1	..	3	..	2	..	40.9	14.0	3.6	1.2	J. C. Garman.
West Bromwich‡	54,000	224	97	28	15	*	*	*	14	12	..	2	2	..	..	5	3	*	*	..	..	43.3	18.7	2.3	*	J. Manley.
West Derby	33,693	83	35	9	8	3	2	4	9	4	..	1	..	..	2	..	1	3	4	..	..	36.0	12.6	1.4	1.1	W. Carter, M.D.
Weston-super-Mare	14,000	30	14	..	1	1	1	5	6	..	..	..	..	..	..	..	..	3	2	..	1	26.1	12.2	0.0	2.6	C. B. Hitchins.
Weymouth	15,269	35	6	2	1	1	..	..	2	..	..	..	..	..	..	..	..	1	..	..	..	27.9	4.8	0.0	0.8	H. Tizard, M.D.
Widnes	22,000	92	27	4	8	4	1	6	4	5	..	..	2	..	1	2	..	10	2	2	..	50.9	14.9	2.8	5.5	W. Cooper.
Willenhall‡	19,300	60	27	8	9	2	1	4	3	9	..	1	4	..	3	..	1	4	2	..	..	32.4	14.6	4.9	2.2	W. H. Hartill.
Withington†	15,000	36	7	2	2	..	..	1	2	2	..	..	..	..	2	..	..	..	..	..	..	31.3	6.1	1.7	0.0	T. C. Railton, M.B.
Wolverhampton†	76,000	219	108	32	17	4	3	26	26	11	..	1	3	..	6	..	1	26	13	4	15	37.6	18.5	1.9	4.5	J. H. Love.
Workington	10,000	61	19	3	4	..	1	7	4	3	..	2	1	..	..	..	..	4	2	3	..	74.2	23.1	3.6	4.9	J. Ward, M.D.
Worthing	9,540	25	11	2	..	1	..	5	3	..	..	..	..	..	..	..	..	2	1	..	..	31.9	14.0	0.0	2.6	C. Kelly, M.D.
York	46,850	127	76	17	5	3	5	22	24	2	..	1	1	..	..	..	..	12	6	1	5	35.3	19.7	0.5	3.1	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 16.45.

fever, however, was below that which has prevailed in recent months.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 3.6 per 1000 persons living in the 182 sanitary districts, against 4.7 and 3.5 in the two preceding months. The death-rates from these diseases during June were, however, excessive in Macclesfield, Bridgnorth, Bootle-cum-Linacre, Neath, Ilkeston, Cirencester, and Stalybridge; in the two last-mentioned sanitary districts the death-rates were equal to 10.4 and 13.4 per 1000 respectively.

Infant mortality, measured by the proportion of deaths under one year to births registered, averaged 115 per 1000 in those of the 182 urban sanitary districts for which the information is available; the death-rate of infants in the twenty larger towns averaged 120 per 1000, against 148, 139, and 136 in the three preceding months. Infant mortality in London during June, which had been 128 and 109 in April and May, rose to 115, against 125 in the aggregate of the nineteen large provincial towns. Infant mortality showed a marked excess last month in Acton, Fenton, Leigh, Pembroke, Liversedge, Morley, and Droylsden.

The table of mortality statistics for June contains, as in the two preceding months, the following sixteen watering-places or health resorts: Bangor, Brighton, Dawlish, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The annual death-rate in these sixteen watering-places during June did not average more than 16.8, and the zymotic death-rate was but 1.6 per 1000 of the estimated population. These figures afford most satisfactory evidence of the present sanitary condition of these health and holiday resorts. The death-rate from diseases of the respiratory organs during June in these sixteen watering-places (exclusive of Brighton, for which this information is not available) did not exceed 2.6 per 1000, while in the aggregate of the sanitary districts in our list it averaged, as before stated, 3.6 per 1000.

We have been favoured by the Local Authorities of Herne Bay and Tunbridge Wells with special returns relating to the health of those important watering-places. During the months of May and June only one death has been registered in Herne Bay. The annual rate of mortality in Tunbridge Wells during June did not exceed 12.1, and the zymotic rate was only 0.6 of the estimated population. These figures afford the strongest evidence of the thoroughly satisfactory sanitary state of these two health-resorts.

SPECIAL REPORTS.

DINNER OF THE COMPANY OF PLUMBERS.

THE Annual Dinner of this ancient City Company was held on the 29th ult. at the Trafalgar Hotel, Greenwich, and the Court and Livery were well represented on that occasion. Among those present were W. Dent, Esq., Master; Messrs. Hunt and Tilley, Wardens; and Mr. Towse, the Clerk; the visitors of the evening being Mr. W. Eassie and Mr. Rogers Field, civil engineers.

After the usual toasts, which were duly responded to by Mr. Digby Seymour, Q.C., Mr. S. Smith, Mr. Hudson, Mr. Towse, and others, Mr. Rogers Field, in reply to the toast of his health, adverted to the great work which lay before the Company, and pointed out how completely the plumber's craft of the present day fell behind the age in point of knowledge and technical skill properly applied on the part of the general community of workmen. Any one could convince himself of this fact, and it was especially patent to sanitary engineers. He trusted that progress would be made in this direction, and felt sure that any such efforts would be generously welcomed by the public.

In acknowledging the toast of his health, Mr. Eassie, among other things, said that surely this particular City Guild had hidden itself in the past under a bushel, for he had heard the want of an organised body like the Company of Plumbers greatly deplored even by some of the leading health societies. He thought it should make itself prominently known, as in regard to its general usefulness it ought to stand in the foremost rank, and he was glad to learn that there was plenty of funds available in its coffers. It ought, he thought, to take some dozen of the best craftsmen into its Livery yearly, and so extend in numbers and general usefulness; such a boon would be eagerly sought after by worthy workmen, who need not necessarily be employers of labour.

THE FIRST HOME HOSPITAL.

THE first English Pay Hospital, belonging to the Home Hospitals Association, and designated Fitzroy House, Fitzroy Square, was opened by the Bishop of Winchester on Monday, June 28th, in the presence of a distinguished company. Patients were first admitted to treatment on July 1st, 1880, and so large was the number of applicants for admission to the advantages and comforts of this Home Hospital that it could have been filled three times over. Such is the excellence of the general arrangements, the perfection of the sanitary provision, and the delightful aspect of the whole building, that we make no manner of doubt admission to it will always be in request. The good taste and feeling for comfort and cheerfulness displayed in the decorations and furniture, give this establishment the aspect of a home, and a home of a first-rate character, and must inevitably tend to the recovery of the patients, by raising the tone of their spirits, and thus assisting the labours of the surgeons and physicians in attendance. We recommend our subscribers when in London to inspect this Home Hospital for themselves, when they will see that our commendations are by no means exaggerated.

The House which has been ultimately adopted as the scene of the Association's first operations stands on the north side of Fitzroy Square, and, except for a special brightness of the exterior, and the remarkably elaborate outer door of carved oak and stained glass, there is nothing to distinguish it in any way from any private house in the Square. The hall is floored with a handsome dark kamptulicon, and is pleasantly distinguished from the ordinary London vestibule by its walls being covered with an artistic paper, bearing a slight pattern of birds and flowers in shades of olive with a dark green dado. The walls are covered with perfectly plain paper of a very pale tint of greenish blue, about the colour of a blackbird's egg. Next to it, and occupying the place of the ordinary 'study', is a bedroom for cases too severe to admit of being carried upstairs, and beyond it, again, at the end of the inner hall, is a very comfortably fitted smoking-room for the use of such

patients as may be sufficiently recovered to be permitted indulgence in that luxury.

The former drawing-room of the house has been arranged for four beds, and is a fine airy room. It has been fitted with Knell's Imperial Window, which, by simply turning a small handle, enables the upper portion to be opened, ventilator-fashion, to any desired extent, and with the *minimum* expenditure of manual force. The floor has been stained to a dark oak colour and varnished, as is the case throughout the house, the only carpets being small and handsome Persian rugs, of which, however, there is ample provision wherever needed, as a resting-place for the feet. Everywhere the bare floor affords that free circulation of air and that absence of opportunity for the accumulation of dust, which is so essential a feature in a well-arranged sick room.

In the bedsteads the regulation hospital form has been adhered to, as being most convenient for nursing, but care has been taken to avoid the hospital appearance by finishing with substantial brass rods and ornaments at the top. The spring mattresses are of woven wire material, more commonly known as sanitary spiral springs, from their being easily kept clean and free from dust, etc., and always allowing a current of fresh air to pass to the under side of the upper mattress. The upper mattresses are of horse-hair, which, although rather expensive at first, have been found most economical in the end for hospital purposes. The pillows are of ample size, and a number of extra ones have been provided.

Each room is provided with a chamber cupboard, made open at the back to prevent unwholesome smells, and also a commode fitted with a patent inodorous pan. In every room, also, will be found a table for the convenience of doctors and nurses, and for the use of patients when convalescent. Small hanging cupboards have been fixed to the walls, to contain medicines, books, etc. A good roomy easy chair will be found in every room; for sanitary reasons these chairs have been caned instead of stuffed, but are large enough to admit of a patient being made quite comfortable with pillows. In some of the rooms will be found tables made for the use of patients obliged entirely to keep their beds, which, when not in use form convenient side-tables in the rooms. Where more than one bed has been placed in a room, a light folding screen has been provided, the frame of the same wood as the rest of the furniture, and with loose covers that can be taken off and washed at any time. Care has been taken in selecting the curtains to have a material which shall be effective and at the same time simple and inexpensive; for this purpose a charming double-printed cretonne has been used, thus doing away with the necessity of lining (a harbour for dust, etc.) The curtains can be taken down at any time and washed in the ordinary way. In the dining room, or more properly the convalescents' sitting room, the object has been to make the room as comfortable as possible; for this reason, instead of one large dining table, several smaller tables have been provided, which can at any time be united to form larger ones. Sofas and easy chairs have been placed in this room, which, being in the present favourite Jacobean style, give it a very homelike appearance; this furniture is of oak with covering of maroon cloth, the curtains being of the same material.

As may be readily imagined, ventilation is a subject which, in the arrangement of Fitzroy House, has received very special attention. Every room throughout the building is amply supplied with the means of removing foul air without creating those draughts which are so particularly to be avoided in the case of a sick room, whilst, besides the arrangement already spoken of as applied to the lofty windows of the first floor, a very ingenious contrivance has been adopted in the other rooms by which the ordinary sash windows can be opened, not only in the ordinary fashion, but after the manner also of a fanlight ventilator.

The sanitary appliances are also of the most perfect description, this branch of the arrangements having been under the immediate supervision of the Architect of the Association, Mr. Ernest Turner, of 246, Regent Street, well-known as an authority on the subject. Not only all the floors and woodwork, but every inch of wall paper throughout the house can be washed whenever requisite, the whole interior being varnished from basement to attic.

The speciality of the establishment in this respect, however, is to be found in the drainage arrangements, which are almost uniquely perfect, and to which we should like to call special attention. The first requirement of modern sanitary science—a requirement complied with in, perhaps, about one London house in every twenty or thirty thousand—is for all communication with the sewer to be completely cut off, and this is, of course, done at Fitzroy House; a syphon-trap, supplemented by an open grating, effectually barring the passage of any solitary bubble of sewer gas. In addition to this precaution, provision has been made, not only for a daily flushing of the whole internal drainage system, but for ascertaining, by actual inspection, that such flushing has been efficiently performed. The general collecting-drain runs from a trapped man-hole in the back yard to another trapped man-hole in the front area, into the former of which the water from a high-pressure hydrant can be turned at any moment through a six-inch hose about half-a-dozen feet in length, the stream being kept up until it is found to issue into the further man-hole in a condition of entire purity. Anyone wishing to see how perfect the drainage of a London house can be made, should make a point of visiting the basement of Fitzroy House.

The ordinary staff of the establishment consists of the Lady Superintendent and three Nurses, supplemented by the assistance which will be rendered by the Nightingale Nurses, or by the Nurses of St. John's House, in cases of emergency, or when extra help is required. There is also a man-servant, who is a trained nurse.

BIRMINGHAM & MIDLAND ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

A MEETING of the Birmingham and Midland Association of Medical Officers of Health was held at the rooms of the Worcester Medical Society on July 1, Dr. Fenton, the President, in the chair. There were also present Dr. Strange (Worcester); Dr. Horace Swete (Droitwich); Mr. Fosbroke (Stratford); Mr. Perks (Burton-on-Trent); Dr. Bond (Gloucestershire); Dr. Wilson (Warwickshire); Mr. T. C. Blackford (Cannock); Dr. Haynes (Malvern Link); Mr. H. May (Aston), Secretary; Dr. Crowe and Mr. Randle Buck (Worcester); Mr. W. E. Green; and Mr. J. W. Sandown.

Dr. Strange read a paper on 'Infantile Mortality in Worcester', which, with the discussion that followed on it, will be published in the SANITARY RECORD for August 15.

CONFERENCE ON THE PROGRESS OF PUBLIC HEALTH.

On the occasion of this gathering, on the 10th ult., many of the members present availed themselves of the invitation given to visit the sanitary arrangements of Spencer House, in St. James's Place. Mr. R. Rawlinson, C.B., explained that, though he had drawn up the general plan of arrangements, they had been carried out and improved upon by Mr. Griffith, C.E. The results attained seemed to be highly favourable, and are due in the main to the substitution of from 4 in. to 9 in. pipes in the place of the old-fashioned large brick drains, and the severance of the connection with the sewer by means of carefully-ventilated man-holes and open gullies. Plans were shown of the old brick drains, which measured in width 2 ft. and 3 ft.; these, when opened, were found to contain large accumulations of foul matter. In some instances a quarter, in others half, and in one instance about four-fifths of the drain were filled with this stagnant solid sewage deposit. Of course the stench was unbearable, and this experience shows that the means of flushing practicable in a private house are not sufficiently powerful to prevent deposit in a large brick drain. Consequently, drain-pipes only were employed, the largest being 9 in. in diameter. A gentle curve is substituted for an angle, and there are openings to afford easy means of clearing the pipes with a brush fastened to rods and thrust in from curve to curve. These man-holes are also placed precisely where the curves occur, so that the latter may be carefully watched; but though these drains have now been used for some years, it has never yet proved necessary to clean them with rods. The fall of the drain-pipes that run through the yard, and act as main collectors, is only one in sixty, and yet the waste water from the house is quite sufficient to flush them effectively. On one side of the yard there is the stabling, and on the other the house; and it is curious to note that there has been not only a great improvement in Lord Spencer's health, but in that of his entire household, and also of his horses. This result corresponds with the date when the new drains were laid down. All waste-pipes are brought out through the walls, are disconnected with the drains, and empty themselves over Doulton's gullies. Where the drains approach the street sewer there are a large man-hole, a syphon between the man-hole and the street sewer, and two large ventilating-shafts. Up the drain to the house there are numerous syphons, ventilators, and breaks in the connection; the ascension of the sewer-gas is, therefore, cut off, not merely by several syphons, but also by the open air that sweeps past wherever the connection is broken.

ENTERIC FEVER AT PRINCETON COLLEGE.

An outbreak of typhoid fever in connexion with impure water supply on a very large scale, has just occurred at Princeton College. The neglect and ignorance of the commonest sanitary precautions revealed in the condensed account we print from *The Plumber and Sanitary Engineer* of June 15, is truly extraordinary, and when the danger to, and waste of, human life in connection with this neglect and ignorance are considered, little short of criminal. Until the architect and sanitary engineer work together, there will be no end to these outbreaks of enteric fever, which, given cesspools, wells in connexion with them, unventilated sink-traps, and all the A B C of disease-inviters, are as sure to break out as that dry wood will ignite when a match is applied to it.

The history of the outbreak dates back about two months. Before that time there had been about the usual amount of sickness in the college, but attention was then specially aroused by the simultaneous illness of seven students in a private boarding house. Examination revealed that the well from which these students drank was polluted from an adjoining cesspool. Prof. Cornwall analysed the water, and found an excessive amount of albumenoid ammonia and free ammonia. An analysis of the water of all the wells and springs from which the students drank was then ordered. As a result ten more wells were shown to be impure. By this time the disease had begun to assert itself in the college buildings; some forty students in all were attacked, but not all at the college. Occupants of all of the buildings were seized, the least number being in old Nassau Hall, and the most in Witherspoon Hall, supposed to be the most complete of all the college buildings.

Princeton is distinctively a college town, and is made up of the college buildings, the residences of the faculty, a couple of hotels, and a moderate number of private dwellings. There are five buildings in which students sleep—Nassau Hall, built in 1756; East College Hall, erected in 1833; West College Hall, erected in 1836; Re-union Hall, erected in 1870; and Witherspoon Hall, erected in 1877.

Up to within a few years, there were no sanitary features in any of these buildings. The bedroom slops were taken out by hand and emptied into small cesspools near by, while water had to be carried up in the same toilsome and primitive way. Out-door privies were used and misused, and everything about the sanitary arrangements was decidedly offensive and unsatisfactory.

Less than four years ago, water closets were introduced into all of the dormitories on the ground floor only, while sinks were placed in each hallway to supply water mainly for lavatory purposes. The water came from a very pure and productive spring, which is still the source of supply, while the waste was carried into a 12-inch sewer which ran across the college grounds and down to a large cesspool, 1,200 feet distant, beside the railroad. This cesspool was 60 feet long, 10 feet wide and 14 feet deep, with an overflow pipe at one end; the bottom was open, and it was supposed that the fluids would drain off in time. There were two man-holes, tightly covered, but no ventilation either to the sewer or cesspool, except into a brick flue in the Witherspoon building and a galvanized pipe which ran up the side of one of the dormitories, close to the windows, and which had been cracked in several places by base balls or in other ways.

The cesspool had *never been cleaned* and was full to the brim. Possibly the sewer is also choked by the deposit backing up. Yet this was the sole receptacle for the sewage of some seven hundred persons, amounting to several thousand gallons daily. The drains from all of the dormitories connected with this cesspool, as did those from the University hotel.

In most of the buildings there was absolutely no bar to the gases produced by decomposition in the cesspool and sewer from entering the bed-rooms, while the absence of ventilation for either the cesspool or sewer left no other exit for them. The waste pipes were not carried above the roof, nor was a

single trap separately ventilated. The sinks were encased in wood and were used to throw chamber slops in, and as urinals; they were necessarily offensive, particularly as the halls in some of the buildings in which they were located had but little light or ventilation. Even in the handsome new Witherspoon Hall the arrangement was no better; in each hall the sink, save an unventilated trap, offered no barrier to the entrance of the cesspool air close to the doors of students' bed rooms; and in this, the newest building, the amount of sickness was greatest.

Despite the fact that, for weeks, disinfectants had everywhere been abundantly used, the odours from some of the fixtures was noisome in the extreme, particularly in the West dormitory, where two of the worst cases of sickness were found in rooms opening on halls, in which the state of the fixtures was but too suggestive of contagion.

Attempts are being made to trace the above outbreak to some primary cause, and to sift the cases into specific classes of disease. But the defective drainage of these buildings at Princeton was sufficient to have poisoned all who occupied them, and it is simply wonderful that so few suffered of the many who were exposed. How the poison was first introduced has not been fully explained, but how it was spread is very evident.

SANITARY LEGISLATION.

A DEPUTATION from the Council of the Social Science Association, consisting of Mr. G. W. Hastings, M.P., Mr. F. S. Powell, Captain Douglas Galton, C.B., and Dr. Alfred Carpenter, waited upon the President of the Local Government Board for the purpose of urging the importance of certain needed amendments in the sanitary laws. The suggestions of the Council, which Mr. Dodson characterised as of high value and importance, were embodied in the following resolutions:—'(1.) That, in order to lessen the evils resulting to health from the growth of suburban districts outside the boundaries of towns having urban powers, authority be obtained to bring both the districts within the boundaries of the town and the suburban districts in every case, whatever be the nature of the local authorities, within the control of one sanitary authority, having urban powers; the central authority to have power to act for this purpose by provisional order, no application from any local authority being required. (2.) That the council, while unprepared to recommend at the present time an entire conformity of rural to urban powers, is, nevertheless, firmly of opinion that the distinction between them is maintained with serious disadvantage to the community in regard to the control of new buildings; and it would represent to Government the importance of giving to urban and rural authorities power to make building by-laws relating to the same subjects, the by-laws themselves to be adapted in each case to the wants and circumstances of the locality. (3.) That in any further amendment of the law provision be made for the better securing the healthy condition of houses before they are occupied, by enacting that no new building be occupied as a dwelling-house until the drainage and water-supply thereof have been made and completed, and until a certificate has been given by a duly-qualified person appointed by the local authority for those purposes that the same is fit for human habitation. (4.) That in any future amendment of the law provision be made for the compulsory registration of infectious diseases; the case to be reported to the local authority by the householder upon information given to him by the medical attendant.'

ANTHRAX AND ALLIED DISEASES.

AT a recent meeting of the Royal Agricultural Society, H.R.H. the Prince of Wales in the Chair, the Hon. W. Egerton, as chairman of the Veterinary Committee, presented a report drawn up by Dr. Greenfield, on an investigation into anthrax and allied diseases, now being conducted at the Brown Institution. From this statement it appeared that some important indications had been obtained towards insuring protection from these diseases. Dr. Greenfield's chief difficulty had been to obtain early information of the outbreaks of splenic apoplexy and quarter-evil. With reference to the resolution of the Council at the last meeting concerning an investigation into fluke disease, commonly known as sheep rot, the committee recommended that, in order to the wide distribution of correct information as to the best means to be adopted to prevent the fluke epizotic, more especially in seasons of the greatest danger, such as that of 1879, and for the treatment of infected animals, with a view to arrest the progress of the malady, a report should be obtained on the practical treatment of the disease and the conditions under which it is developed. Doubts having been expressed by agriculturists and others of the correctness of the descriptions hitherto given of the method of the development of the fluke and its entrance into the bodies of animals, the committee further recommended that Prof. Rolleston be asked to make a fresh investigation into the life, history, and development of the fluke, and to report thereon for the information of the members of the Society. The committee applied for a grant of £250 to enable them to carry out these investigations. Mr. J. D. Dent said, with respect to the practical portion of the inquiry, it was thought that the gentleman selected should himself go into the districts which were particularly affected, and also, if he considered it necessary, into the districts only partially affected. From the reports already sent to the secretary, it was evidenced that any well-informed person would have no difficulty in finding out much valuable information. Then there was the question raised by Mr. Rawlence of flukes being found in the livers of calves which had never anything but their mother's milk. It was important that such matters should be investigated, and he might add that Professor Simonds was ready to give any assistance that lay in his power. The report of the Committee was adopted.

THE SANITARY INSTITUTE.

THE annual meeting of the Sanitary Institute of Great Britain was held on the 29th ult., to elect officers and receive the annual report and financial statement. Dr. B. W. Richardson, F.R.S., was in the chair. The statement of accounts for the year ending December 31st, 1879, showed a great increase in the balance of the funds in hand as compared with previous years. Up to the present time the funds and property of the Institute have not been invested as was intended on its formation, but the Council offered for election as Trustees three gentlemen who were willing to undertake that responsible position, Dr. Richardson, Sir A. Brady, and Mr. T. Salt. Two examinations were held during the past year under

direction of the Council, for local surveyors and inspectors of nuisances. Nine candidates offered themselves for examination to enable them to obtain certificates of competence. Two of the local surveyors and five of the inspectors of nuisances passed the necessary examination. The names of the following gentlemen were submitted to fill vacancies on the Council:—Dr. A. Carpenter, Mr. W. Hopton Ellis, Mr. R. B. Grantham, Mr. George Palmer, M.P., Mr. T. Salt, and Mr. W. Crookes. Mr. G. J. Symons, F.R.S., has been elected Registrar in place of Dr. L. Marsh. It was stated that arrangements were nearly concluded as to the occupancy of more commodious offices. The sum of £200 as a prize for an essay 'On the Range of Hereditary Tendencies in Health and Disease' having been offered by the Rev. E. Wyatt-Edgell, a notice on the subject has been widely circulated at home and abroad. The essays must be sent in before August 1st, 1880.

The Chairman said the work of the Sanitary Institute had gone on vigorously during the past year, and with a considerable amount of success. They had done as much as they could, and if it was said that that was little, their reply was that voluntary efforts had to wait for Governmental. It was the legislator who should move and bring into practice what that Society had been endeavouring to advance in principle. They did hope when the late Government came into office that the voice with which its coming labours were announced—a voice then supreme in command—and which declared solemnly and loudly '*Sanitas sanitatum omnia sanitas*', would not be a mere voice. In that expectation they had been sorely disappointed. The years had passed, the voice and nothing else had been revealed. He trusted that a new Government, strong, ambitious, powerful, and professedly homely in its intentions, would be more ready to carry out the great purpose embodied in the cry, '*Sanitas sanitatum omnia sanitas*'. There seemed to be a great deal for a Government to do, but most of the difficulties were apparent only, and would quickly pass away if they were boldly met. But they must begin on a new basis. All the present divided interests and offices of health connected with Government must be brought under one department, with a responsible Minister of Health at its head. The Health Departments of the Local Government Board, of the Home Office, of the Privy Council, of the Registrar-General (with a registration of disease), together with the official meteorological records, and other similar or allied functions, required to be put under a central Board, with efficient directors for each section, and a competent energetic presiding chief over the whole. Then, in a few years, the life history and the life value of this nation would be understood with a discernment and understanding of which at present we had no conception, and with results which would be as momentous as they were unexpected by the masses of the people. It must be a part of their work in the coming year earnestly and respectfully to urge this course on the Government, and if the press would continue to give its all-powerful and ready help, it could hardly fail but that some useful advancement would be the outcome of their importunity and restless determination to make national health the bank of national wealth and future ascendancy.

On the motion of Mr. E. Chadwick, seconded by Captain Galton, the report was adopted, and the ballot for the officers of the society was taken.

DR. S. WILKS, F.R.S., ON OVERWORK AND UNDERWORK.

Dr. Samuel Wilks, F.R.S, delivered a lecture on May 20th, under the auspices of the National Health Society, at the residence of Mr. C. Matthews, 23, Hertford Street, Mayfair. The lecturer commenced by remarking that the questions of overwork, over study, and underwork could not be settled by any fixed rule, and the only way in which they could be considered would be in the physiological aspect—by comparing the body to a machine and estimating its capabilities, or regarding it as a kind of chemical laboratory in which various forces were engaged in the supply of food to supply the furnace; always remembering, however, that the animal body, unlike the mechanical one, could not be wholly continuous in its action, as rest was necessary to the production of animal power. Rest and work were as natural as light and darkness, day and night, and when the physician was asked sometimes if a man could work the twenty-four hours at physical labour, the answer would be that, given a proper time for food and sleep, a man could work all the rest of the twenty-four hours. But proper food and proper rest were necessary in all classes of work—a fact not recognised by people of supposed intelligence, as he had had to prove to an enthusiastic young curate that he would be able to do better work by proper attention to his physical wants—that this attention to the body was a religious duty in order to enable a man to work to the full extent of his powers. With regard to the people who suffer from nerve depression, Dr. Wilks held that the mode of life of those who thus suffered sufficiently accounted for their condition—that they had pursued a course of living which had made its effects felt in pressing mental toil of one kind upon the brain over lengthened periods. The question was asked if, by a person having physical exercise, good food, and rest, the rest of the intervening hours could be healthfully spent in mental labour. This was a question which could not be answered by rule. The points would have to be considered as to the amount of physical exercise to be taken, and the kind and the character of the mental labour. There were some kinds of mental labour which were mere relaxations against others, and remarkable examples had been presented by the vigour derived from various exercises in mental labour alternated with physical exercises: but where the mental labour had been attempted without the physical the persons had broken down. Some persons, holding to the idea that 'use is second nature', had not accustomed themselves to physical exercise in the midst of their mental labour; but there was a necessity for this physical labour, and the body required it. The necessity first was shown by the studious man pacing his room, as the animals paced their cages in the 'Zoo'; by the errand boys in the streets putting down their goods to fight other boys, or in their overing posts—all these were actions showing that the body needed exercise. Then came the question—If a man has good food, rest and exercise, can he spend the rest of the hours in mental labour? The answer was—Certainly he can; but it must not be one kind of mental labour or one kind of pursuit, for one pursuit would abnormally exercise one small faculty of the mind and cause it to be overworked, to the impoverishment and loss of other faculties. Such a man would have strong opinions about things of which he knew nothing—he hated foreign languages, and knew nothing of them; he abhorred theatres, and never had been to

one; disliked Darwin's views, but would say, 'Never read a volume of Darwin's in my life, and never will.' On the other hand, political history was filled with facts about men with many ideas and examples of the good in varied work — Lord Palmerston, Lord Brougham, and others, especially dwelt upon the case of an eminent statesman who, at seventy years of age, held the highest place in politics, could turn with freshness to a theological controversy, could discuss learned questions with the utmost vigour, and was known to love physical exercises. The right hon. gentleman referred to was known to spend his waking hours in the highest mental work, varied by physical labour, was stated to sleep soundly, and presented a living example of the value to be attached to varied mental work, this varied mental work also being added to by physical labour. The lecturer, speaking upon the subject of sleeplessness in some brain-workers, stated that this arose from a too continuous toil in one class of brain work. In all such cases he advised changes of mental work, giving cases to show that the sleeplessness was induced by the brain being overcharged with the worry of one mode of thought which had filled the man's mind morning, noon, and night. Dr. Wilks insisted upon the necessity of work for the mind and body, and in the cases of young men urged that they should have at least two occupations, even if the second should only be a hobby. As to women, he insisted that the ladies in towns suffered from lack of proper occupation, and the illnesses supposed to be induced by overwork were in reality the result of want of means of using the mental and physical energies possessed. The women in the lower orders used their superfluous energies in wordy warfare—in a general mutual undervaluation, and in bygone times ladies used to throw off theirs in hysteria. He did not advise ladies to follow men's professions, but he advised a healthful use by women of their mental and physical powers. With regard to the late discussions in the *Times* as to the overwork in girls' day and Board schools, he said that all other proper conditions observed, he could not admit that the few hours' mental work which the girls had could do harm; the harm would arise if the girls had to go home to a stuffy room to mind the baby, were badly supplied with food, or slept in a bad atmosphere. It was unfair in these cases to blame the school and the lessons; the causes of the so-called overwork were outside of the school or the lessons.

GERMS: UNSEEN ENEMIES.

THE third of this series of lectures was given by Professor E. Ray Lankester, F.R.S., (under the title of: 'Germs: Unseen Enemies'. It seemed, he said, that heat is a certain destroyer of all germs, if it be of long continuance and of sufficient degree. Boiling is an undoubted means of effectually 'sterilising' all *vibrios*. In some laudatory remarks on the antiseptic views of Professor Lister, Professor Lankester stated that a solution of carbolic acid, 1 in 20, will, if it be brought thoroughly into contact with germs, at once render them inert. The classification of these 'unseen enemies' was, he allowed, not very perfect. It was at present only based upon the effects produced, rather than on any special variety in their growth or appearance. Three varieties were described—namely, those producing odours, those coloured products without odour, and those recognised as disease-producing germs. All bad smells, except those arising from chemical works and their products, were, he stated, due to the presence of *vibrios*. With regard to the disease-producing varieties, it was yet quite a matter of doubt whether (with the exception of two diseases—malignant pustule and splenic fever) the presence of the particular form of bacteria caused the disease, or whether it was not merely associated with the condition of the patient and the debilitated state of the system generally. Mr. Lankester, in the course of his lecture, suggested that it would be profitable, in the best sense, to establish laboratories and suitable opportunities for prosecuting original scientific research by competent professors into the many wide and important questions associated with the subject of the presence of unseen enemies in the daily life of our population.

EDUCATIONAL PRESSURE.

AT a recent meeting of the Social Science Association, Mrs. Garrett-Anderson, M.D., read a paper on 'Educational Pressure', in the course of which she dealt principally with the pressure which existed in the best secondary schools for girls. Having pointed out the physical difficulties in the formation of schools under the existing day-school system, Mrs. Garrett-Anderson proceeded to urge that the present duration of the morning school was opposed to real good work, to a healthy condition of brain and nerves, and to sound digestion. This was a weak plan, and its weakness lay, in her view, in the division of the responsibility between the mother and the schoolmistress, as far as the physical health of the children was concerned. Having urged these points at some length, Mrs. Garrett-Anderson concluded by urging the following points upon the notice of mothers and teachers:—(1) To get the elements of knowledge well and thoroughly taught at an early age, and not to urge the child to make up for early neglect by taking a very extensive range of subjects as soon as she goes to a good school; (2) to accept two-and-a-half or three hours of class work as long enough at one time for almost all children, and to provide two or three short intervals of rest—*e.g.*, five minutes or ten minutes in each hour—during even this time; (3) to insist upon every girls' school having a playground; (4) to aim at greatly reducing the amount of writing in the home work; (5) to reduce the number of examinations, and especially to make them as unstimulating as possible, and to apply them with great reserve to the children most likely to shine in them; and (6) not to aim at completing the education by the age of 18. The main purpose of Girton and Newnham Colleges was to encourage young women to continue their education in an organised manner after they cease to need the restraints imposed upon schoolgirls, and the existence of these colleges rendered it more than ever unnecessary to attempt to teach girls everything they ought to know in early adolescence.

Dr. J. W. Tripe, Medical Officer of Health for the Hackney District, which comprises the parishes of St. John at Hackney and St. Mary, Stoke Newington, has just reported to the Hackney Board of Works the lowest death-rate for this time of year that he has ever recorded for that district—namely, 13.3 per 1,000 population, against 19.2 per 1,000 for all London. There were only 93 deaths registered in the Hackney District during the fortnight ending May 29, against 214 births, being at the rate of 230 births for each 100 deaths. There was a decided diminution in the number of small-pox cases.

LAW REPORTS.

WATER ANALYSIS.

At the Birmingham Police Court, Mr. George Edwards, of Edgbaston, as agent for Lord Calthorpe, was summoned to show cause why an order should not be made upon him to close a well on his premises at Edgbaston. Mr. Redfern (Town Clerk's Office) appeared for the Corporation, and stated that the well in question was the only means of supplying five houses, all of which were occupied, with water. A sample of the water was taken in January, another in March, and three samples were taken in May, all in this year. The first two samples and one of the three samples were submitted to Dr. Alfred Hill, the Medical Officer of Health, who made three separate analyses. Dr. Hill reported that all three analyses were remarkably concordant, and showed that the water was contaminated with animal matter, and in his opinion the water was unfit for domestic use. The other two samples had been submitted to two independent analysts. Mr. Redfern then read a letter from defendant's solicitors intimating that the defendant would not call any scientific witnesses, but would apply to the Court to order a further analysis to be made, pursuant to the power given to the Court by the Public Health Act, and that the defendant would refer to analyses of the water, which the defendant had himself obtained. Mr. Redfern then asked Mr. Kynnersley to decide whether he would permit the defendant to refer to the analyses which he had obtained, because in that event he should claim the like privilege of referring to those obtained by the Corporation. Mr. Kynnersley having decided to admit the reference, formal evidence was given of obtaining the samples, and Dr. Hill was called to prove the results of his analyses. He gave in detail the results, and stated that in his opinion the water was dangerous to the public health, and that the well ought to be closed. Mr. Edwards then stated that he had no intention of setting the law in defiance, but that he had refused to close the well on the strength of advice given by several analysts who had analysed the water. He handed in a number of analyses, and Mr. Redfern then quoted from one made by Dr. Frankland, F.R.S., who stated that the water, though clear and palatable, consisted largely of the soakage from sewers or cesspools, and that it contained a considerable quantity of animal matter. He also stated that it was a dangerous water, and quite unfit for dietetic purposes, and that in the interest of the public health the well supplying the water should be closed. Mr. Kynnersley read the certificates handed in by Mr. Edwards, and pointed out that nearly all of them confirmed the opinion expressed by Dr. Hill, and said that having regard to that fact, and to the certificate of Dr. Frankland, he could not undertake the responsibility of allowing the well to remain in use, and he must, therefore, order it to be permanently closed.

Queen's Bench Division.

THE REMOVAL OF HUMAN REMAINS.

The Queen v. *Jacobson.*

This was an indictment for a misdemeanour, the offence charged against Mr. N. W. Jacobson being that of having wilfully and indecently caused the removal of certain human remains.

Mr. Mead, in opening the case, quoted the words of Mr. Justice Byles in the judgment in 'Foster *v.* Dodd and another' ('L. R.' 3, Q.B., p. 67), who there said, 'A dead body by law belongs to no one, and is, therefore, under the protection of the public. If it lies in consecrated ground, the ecclesiastical law will interpose for its protection; but whether in ground consecrated or unconsecrated, indignities offered to human remains in improperly and indecently disinterring them are the ground of an indictment.' The learned counsel said the facts of the case were that in 1862 the whole of the burial-ground attached to Whitfield's Chapel, which is in Tottenham Court Road, was sold for the benefit of the mortgagees under an order of the Court of Chancery in a foreclosure suit instituted by them against the trustees. During the whole period from 1756 to 1853, interments had regularly taken place, with the exception of the years from 1828 to 1831, and no less than 30,000 persons had been buried there from first to last. In 1853, the burial-ground was closed by an Order in Council. The ground was in all less than three-quarters of an acre in extent, and at the sale in 1862 the lots were described as commanding freehold sites for building, and as being offered for sale, subject to such right, if any, as was or might be possessed by persons who had interred bodies in the ground. As to the two lots bought by the plantiff, it was admitted that no such rights existed. In 1863, Mr. Jacobson commenced removing the earth from a part of the ground for the purpose of building on it, but a summons was taken out against him under section 25 of 20 and 21 Vict., cap. 81, which renders any person removing, save under faculty, any body or remains of any body interred in any place of burial liable to a fine not exceeding £10. On that occasion he pleaded 'Guilty', and was fined £5. In 1879, the Vestry of St. Pancras commenced to lay out the ground and to build a wall and set up a railing round it. Upon this Mr. Jacobson brought an action in the Chancery Division with a view of preventing the Vestry from further interference with the ground. The Master of the Rolls, in giving judgment in that case in February last, held that the freehold was in Mr. Jacobson, subject to the common-law obligation of not improperly and indecently disinterring any human remains there, and granted an injunction restraining the Vestry of St. Pancras from putting up any wall, fence, or other erection on the ground. The defendant entered into a contract with one Cousins in March last, under which the latter was to excavate the ground and screen from the mould all human remains, and place them temporarily in a trench until a vault sufficiently large to hold them all had been there constructed for their reception. It was also stipulated in this contract that proper disinfectants should be used for the protection equally of the workmen employed in the excavation and persons living in the immediate neighbourhood. Mr. Jacobson, in addition to the workmen employed by the contractor, himself sent two men to watch that no human remains of any kind were removed in the mould that was carted away. On March 31 last, the Vestry of St. Pancras took out a second summons, under 20 and 21 Vict., cap. 81, which was, however, dismissed, the Master of the Rolls having held that the land was no burial-ground; either *de facto* or *de jure*, as no interment had taken place there for 20 years and it had never been a consecrated place of burial. Immediately on the dismissal of this summons, a new one was taken out against Mr. Jacobson, charging him with a misdemeanour at common law in having caused human remains to be improperly and indecently disinterred. On that charge he was com-

mitted for trial, and it would be for the jury to say whether the evidence adduced satisfied them that he had been guilty of that offence.

Evidence was given as to the number of the persons who had been buried and as to the way in which their remains had been disinterred last Easter. One witness was called and gave evidence that her father, mother, sister, and eight of her children had been buried at the spot at which the excavations had been made.

Witnesses having been called to prove that they had been specially instructed by the defendant to see that no bones were carried away with the mould that was sold,

The Lord Chief Justice briefly summed up the case to the jury, telling them to consider the three following questions:—1. Were the bones disinterred human remains? 2. If so, were they parts of entire skeletons? 3. If so, was their disinterment done in an improper and indecent manner?

The jury answered the first two questions in the affirmative and the third in the negative.

His Lordship directed a verdict of *Guilty*, subject to a case for the full Court on the question as to whether the removal of the bodies was not in itself indecent and improper, the jury having found it was not so in manner. The best course would be for the prosecution to move for judgment as soon as possible.

THE CANAL BOATS ACT.

Ten summonses were heard at the Marylebone police court against persons for unlawfully permitting boats to be used as dwellings on the Grand Junction Canal, Paddington Basin, contrary to the Act that came into force in June 1879. The cases were proved by Dr. Stephenson, medical officer of Paddington, and Mr. T. Reeves Clifford, sanitary inspector.—Mr. Cooke inflicted fines varying from 5s. to 10s., with costs in each case.

THE SPREAD OF INFECTIOUS DISEASES.

Edward Sands, a broker, was summoned for 'transmitting' a quantity of bedding from a room in which a person had suffered from a dangerous and infectious disorder, without disinfecting the same. Dr. Tripe, medical officer for the parish of Hackney, stated that the defendant was a broker, who had seized the goods in question under distraint for rent, and removed them from Hackney to Clerkenwell, though informed that the bed had been used by a person suffering from scarlet fever. The defendant was liable to a penalty of £5.—Mr. Hannay said the section of the Act said nothing about knowledge of the state of the property; but he presumed that was necessary.—Dr. Tripe said he would prove that the defendant was told. He then gave evidence as to visiting the house, and to finding a boy suffering from scarlet fever. He considered that the boy was still infected, and the germs of scarlet fever would remain in bedding for many months.—Mrs. Gladwin deposed that the defendant entered her house under a distress for rent, and removed the whole of her furniture except one little bed left for the children. Her child was then lying ill with scarlet fever, and two other children had been ill shortly before. A child in the parlour was also lying ill. The defendant, when she told him the facts, said that it was seven days' fever, and he would take the responsibility. He removed all the goods without disinfection in an open van through the streets.—Mr. Hannay said he was called on to enforce the law in this case, for *salus populi suprema lex* was a good law, and though the defendant might have been urged on by the landlord to make this levy, he must take the consequences of what he had done. He ordered the defendant to pay a fine of 40s. and 14s. 6d. costs.

ARSENICAL PAPERS.

This was a case in which the plaintiffs, Messrs. Steinhoff, sued the defendants, Messrs. Wm. Woollams and Co., wall paper manufacturers, of High Street, Manchester Square, W., for certain sums said to be due for colours supplied to the latter. Defendants refused payment, on the ground that the colours were verbally guaranteed by the plaintiffs' agent as non-arsenical, whereas one of them, called 'Imitation Azure Blue', did, in fact, contain a large quantity of arsenic. Previously to discovering this fact, defendants had used the pigment in the manufacture of wall papers, and, as it has been a strict rule with them for years past to allow no arsenical colours to be used in their factory, they were thrown between the alternatives of endangering their reputation by the sale of goods detrimental to the public health, or of having the stock of arsenical paper they had unwittingly manufactured left on their hands. They chose the latter course, and now made a counter claim on the plaintiffs for £370, as compensation for the loss incurred.

Mr. Frederic Aumonier proved that he was now sole proprietor of the business of the defendants, and traded under the style of Wm. Woollams and Co.; that his firm had dealt with the plaintiff for non-arsenical colours continuously since 1862; that the plaintiff's traveller (Mr. Cobbe) guaranteed the 'Imitation Azure Blue' to be free from arsenic at the time the first order was given for it; that it was bought and used on the faith of Mr. Cobbe's assurance that it was free from arsenic; that he continued to use it until his attention was called to the fact that one of his papers contained arsenic; that he then had all the colours used in his manufactory tested by a competent analytical chemist, when it was found that the 'Imitation Azure Blue' was the only one that contained any arsenic; that he at once discontinued the use of the said blue, and withdrew from sale all the stock contaminated by it, to the value of £370, or thereabouts, that he had in Court samples of all the papers spoilt; and that he had a number of his workmen in Court who were prepared to prove in detail the employment of the arsenical blue in staining all the papers complained of; that he had had all his colours tested by Dr. Bartlett, Mr. Bernard Dyer, and Mr. R. E. Alison, competent analytical chemists; and that he was otherwise prejudiced by the expense he had been put to in the examination of his stock.

Mr. Bernard Dyer, analytical chemist, proved that he had tested the 'Imitation Azure Blue' by various processes, and found it contained over 50 per cent. of arsenic. He had also tested several papers coloured with it.

Mr. Charles Barton Cobbe, traveller to the plaintiffs, denied most positively that he had guaranteed the 'Imitation Azure Blue' to be free from arsenic.

Mr. Wm. Muir, partner with the plaintiff, said Mr. Cobbe had no authority to guarantee.

Letters from the plaintiffs to the defendants were produced, stating that all the colours and flocks supplied by plaintiff to defendants were free from arsenic.

Mr. Justice Bowen summed up, and, after directing

the jury that any statement intended to be a warranty made at the time of sale was a warranty in law, and that if Mr. Cobbe, although not authorised in words, was, by his position in the plaintiffs' service, authorised in their opinion to do all things needful to sell the colours, and that he did guarantee the colour to be free from arsenic, his employer would be bound by what he said, left it to the jury to say whether the colour was sold free from arsenic by the plaintiffs' agent, and whether he was authorised to give a warranty.

The jury found for the defendants, Messrs. Woollams, on both points, and a verdict was entered accordingly, the amount of damages to be settled by arbitration.

DISEASED MEAT CASE.

At the Petty Sessions for the divison of Bromfield, of the county of Denbigh, Richard Rogers, butcher, was summoned under the 117th section of the Public Health Act, 1875, for having on his premises two carcases of sheep dressed for sale, that were so dressed as not to be fit for the food of men. At the instance of Mr. Hugh Davies, Rural Sanitary Inspector of the district, the inspector found on the premises, an old cowshed used for slaughtering, three carcases prepared in the usual way for market, one of them highly diseased, the other also diseased, and seized the two carcases. The Chairman, in consideration of this being the first case that had come before them in the district, fined the culprit £5 and costs for the present offence, with a caution to be more careful in future, as the penalty might amount to £20 for each sheep.

BUTTER PROSECUTIONS.

At Southwark, Charles Henwood was summoned by Mr. Thomas, sanitary inspector of Bermondsey Vestry, for selling as pure butter a mixture consisting of animal fat, salt, and water. Elisha New entered the defendant's shop, and asked for a pound of shilling butter. He was served from the slab, and on leaving the shop he handed the butter to Inspector Thomas. There was no label on it describing it as 'margarine butter', but he saw similar labels about the shop. He purchased it as pure butter. Henry Thomas, sanitary inspector in the service of the Bermondsey Vestry, produced Dr. Muter's certificate, showing it to consist of animal fat to the extent of 88 per cent. There was not a particle of butter in it. For the defence it was contended that it was not sold as pure butter, but as 'margarine butter'. Mr. Slade said butter was asked for, and the purchaser had been served with a different article. He fined the defendant £5 and 12s. 6d. costs.

WATER WASTE PREVENTERS.

The East London Waterworks Company were summoned by Alfred King for that they did neglect to furnish to him, being an owner of a house, and entitled to receive the same, a supply of water during the time the rates for such supply had been paid. Mr. George Lewis, who appeared for the complainant, said that the company had kept his client, on some buildings he had erected in Bethnal Green, without water for nearly six weeks, although notice had been given and the deposit paid. Mr. Lewis called attention to the regulations for supplying water by the defendant company, and the section imposing a penalty of £10 for refusal having been pointed out, Mr. Wragg, who appeared for the company, intimated that the objection on the part of the company was to the fittings. By the regulations the company had a right to refuse to supply water until the water-closets and water supply apparatus were fitted with an efficient waste preventer, so that no more than two gallons of water should be supplied at one flushing. On the premises in question an apparatus which the company's engineer could not approve had been fixed, and hence the refusal. Evidence was then given by the plumber employed on the buildings as to the fixing of the apparatus—the 'Waste not', of Messrs. Tylor and Sons, Newgate Street—and as to the efficiency of the same in complying with the regulation as to preventing a flow of more than two gallons at one flushing. In reply to Mr. Lewis he said that at one time the water companies sought to have specified in their Acts the apparatus that should be used. A committee was, however, appointed on the matter, and it was shown that it would cost over £4,000,000 to supply London houses under such a regulation. Witness was examined on that committee, and in the end the regulation stood that an efficient waste preventer should be fitted. The waste preventer he had patented was in use in most of the great water companies, and was not liable to easily get out of order. Mr. Wragg showed that the apparatus was fixed under the seat of a water-closet, and was worked at the same moment with the ordinary valve. The company's engineer objected to this mode of employing a waste preventer, and claimed that the company had a right to say what apparatus should be employed. Mr. Lewis pointed out that there was nothing in the regulations of the defendant company which gave them any such power, or in any way prescribed how the apparatus should be fixed. Mr. Hannay, in giving judgment, said that he could only come to the conclusion that it was an afterthought by the company to say that the apparatus was not efficient, and the regulations gave them no power to say that the apparatus should not be fixed under a closet seat. He imposed a penalty of £5 on the company, and ordered them to pay £10 10s. costs.

EXPOSURE OF A FEVER PATIENT.

Agnes Starkey (in whose absence her husband appeared), wife of John Starkey, architect, of Kendal, was summoned on a charge of exposing her daughter, Janet Starkey, without proper precaution against the spread of scarlet fever, from which the child had been suffering.—Mr. Starkey said that neither he nor his wife had been aware that the child was suffering from any contagious disease. His wife had not had any experience of scarlet fever or its effects, and the child being delicate, and suffering from occasional attacks of indisposition, they were under the impression that it was suffering from one of those attacks, and a little cold. He should ask that it might be proved by medical testimony that it was scarlet fever that the child had been suffering from.—The Bench inflicted a fine of £2 and costs, £1 19s.

DISSEMINATION OF INFECTIOUS DISEASE.

Scarlet fever and measles are very prevalent in several towns in the North, owing, principally, to the culpable carelessness of parents allowing their children, before they have recovered from infectious disease, to associate with others. This

reprehensible practice prevails to such an extent in some places that the Sanitary Authorities have felt it their duty to issue a public caution warning the ignorant and thoughtless of the penalties they incur by thus infringing the act. Notwithstanding this caution, on the 30th ult., Ann Moor, a widow, was summoned before the South Shields Magistrates for that on the 26th ult. she, being the person in charge of a certain child, whilst it was suffering from scarlet fever, did unlawfully and wilfully allow the said child to be exposed, without taking proper precautions against spreading the said disorder, in a public street. Dr. Dalziel, Medical Officer of Health, stated that although he had previously cautioned the defendant against allowing the child to go out of doors, he saw the child, whilst still in a very dangerous state of infection, amongst a number of other children in the street. It was represented that the woman was in receipt of parish relief, and had no means of paying a penalty. The Mayor told her the full penalty for this dangerous offence was £5, and as a protection to the public, and as a caution to others, the defendant was fined forty shillings and costs.

DELAY IN LAW PROCEEDINGS.

The Tottenham Local Board of Health v. *Rowell.*

This was an action by the Tottenham Local Board to enforce a charge upon the property of the defendant for the sum of £25 and interest from February 1873, being the amount of a rate levied upon the inhabitants by the Board under the powers of their Act of Parliament for work done in providing sewers and repairing the roads and footways. It appeared that the works were done some time in the year 1865, but the expenses incurred by the Board were not until the 31st of January 1873, duly apportioned by the surveyor of the Board, and the demand was made for payment in the following month. The objection to payment was made on the ground that the mode of recovering payment as directed by the various Acts of Parliament was by personal action within six months, and no steps having been taken to recover the money from the defendant within the specified time, it was too late now to enforce a charge against his property.

The Vice-Chancellor said this was a question depending upon the various Acts of Parliament. The first was the Public Health Act of 1848, cap. 63. By the 69th section of that Act it was provided that improvements of this nature might be made by the Local Boards, who were to recover payment from the owners of property in a summary manner, and by the 129th section the summary manner was described to be before two magistrates, and if the amount assessed by them should not be paid, then the magistrates had power to issue a distress upon the goods and chattels of the defaulter. It was also provided by the 133rd section of that Act that no proceedings for the recovery of such sums should be taken after the expiration of six months. Then this power was extended by the Public Health Act of 1858, cap. 98, and it was provided by the 62nd section that the expenses incurred under the Act might be made a charge on the premises assessed to the rate, and the assessment was to be binding unless within three months the person assessed should dispute the amount. Then by the Act of 1861 it was provided that the summary proceedings taken under the previous Act might be taken before the County Court when the sum claimed was under £20. Now, these proceedings were commenced in 1873, and the plaintiffs were bound to give notice to the owners of property within a specified time, and if payment was not made, they had their remedy under the various Acts of Parliament. They could take the case before the Justices, or they could levy a distress, or, if the claim was under £20, they could go to the County Court. It had been argued that, although proceedings before the Justices must be taken within six months, that was not necessary in the case of a charge upon the property; but it had been decided in a case before the Exchequer Court, that after six months an action was not maintainable. In this case proceedings might have been taken within that period, and the defendant would have been able to pay the demand, and the payment might then have been enforced. There was no excuse for proceedings not having been taken within the prescribed period. Then the plaintiffs, in 1876, went before the County Court instead of the Justices upon another of these claims, and that claim was dismissed; and when they could not obtain payment by that means, they came to this court to enforce a charge upon the property, and it was contended that, though the plaintiffs had lost their remedy by summary proceeding, they might still enforce a charge on the land for the £25, which they might have recovered at once from the defendant. His Lordship could see no reason why a man should have a claim like this hanging over his head for so many years, which might have been disposed of at the time. He considered, therefore, that, as the plaintiffs had not taken proceedings within six months, they could not now enforce their claim. They were not, in his opinion, justified in bringing this action, and it must be dismissed with costs.

LEGAL NOTES AND QUERIES.

TWO CONVICTIONS FOR OVERCROWDING.

I shall be greatly obliged if you will kindly give your opinion on the two following questions in your next issue, viz.: (1) In cases where a Court of Summary Jurisdiction under the 109th section of the Public Health Act, 1875, direct the closing of houses, etc., whose duty is it to carry out such directions, the police, or the local authority?

(2) If the latter, what is the usual mode of procedure in carrying out such directions?

JAMES FARRINGTON,
Inspector of Nuisances.

Aston Heath, Cheshire.

(1) This is rather a moot point in practice. The party really most interested is the Local Authority, and unless the officer of that authority bestirs himself it is not likely that the police will trouble themselves much in the matter.

(2) The usual mode of closing a house is to shut it up! We can hardly answer the question more definitely. ED.

THE NEW PETROLEUM ACT.

The new Petroleum Act, passed at the close of the late session, came into operation on Jan. 1, continuing and amending the Act of 1871. The test of petroleum is altered, and a full description of the apparatus is given in a schedule. It is declared that in the Petroleum Act, 1871, the 'petroleum to which this Act applies' shall mean such of the petroleum

defined by section 3 of that Act as, when tested in manner set forth in schedule 1 to this Act, gives off an inflammable vapour at a temperature of less than 73° of Fahrenheit's thermometer. A model of the apparatus for testing petroleum as described in schedule 1 of the present Act is to be deposited with the Board of Trade; and the board, for a fee not exceeding 5s., is to cause to be compared with such model and to verify every apparatus, constructed in accordance with schedule 1 to this Act, which is submitted to the board. The Act of 1871 is to continue in force until otherwise ordered by Parliament, and the extent of the repeal is set forth in another schedule. The model apparatus is deposited at the Weights and Measures Department of the Board of Trade.

OPERATIVES' MEALS.

The Home Secretary has extended the special prohibition of the Factory and Workshop Act against women and young persons taking meals in factories to every factory or workshop in which white lead is manufactured, except any room thereof used solely for meals; every part of a factory or workshop in which dry part powder or dust is used in any of the following processes:—lithographic printing, playing-card making, fancy-box making, paper staining, almanack making, artificial flower making, paper colouring and enamelling-colour making.

THE AMENDED ADULTERATION ACT.

In his quarterly report to the Strand Board of Works, Mr. C. H. Piesse, F.C.S., public analyst for the district, calls attention to the operation of the Sale of Food and Drugs Amendment Act, 1879, which has recently come into force. Besides providing for the sale in 'public places' of such articles as are covered by the original Act, the new statute contains an important clause fixing a standard of strength for spirits sold by retail—viz., 35 under proof for gin, and 25 under proof for brandy, whiskey, and other distillants. Any spirits falling below this standard are deemed to be adulterated, unless due notice is given at the time of sale. Under this Act the notice commonly displayed by publicans, to the effect that the spirits they sell are 'diluted', no longer affords legal protection, although the trade as a body appear to be ignorant of this fact.

ENCLOSURE OF COMMONS.

The 8th section of the Commons Act of 1876 confers certain rights on urban sanitary authorities with respect to the enclosure of commons in the neighbourhood of towns. The commons affected are those that are wholly or partly situate in towns or within six miles of one, the term 'town' being here taken to include any municipal borough, Improvement Act district, or Local Government district that has a population of 5,000 inhabitants at the least. Mr. Mundella wishes these 'suburban commons' to include also all commons that are situate either wholly or partly within ten miles of any town containing at least 25,000 inhabitants, or within fifteen miles of any that contain at least 100,000. The last section of Mr. Mundella's Bill would render it unlawful 'for any person to enclose, except with the consent of Parliament, the whole or any part of a common or reputed common which shall be situate within the distance prescribed by the Commons Act of 1876 in respect of suburban commons'.

REVIEWS.

Artificial Disinfection as a Means of Preventing the Spread of Infectious Disorders. By the Rev. J. H. TIMINS, M.A., F.G.S. London: J. & A. Churchill. 1878.

In the preface the author states that, although a clergyman, he received a regular medical education for four consecutive years at St. Thomas's Hospital. He commences his useful little book by stating that infectious diseases may be divided into two classes, viz., those which are properly contagious, that is to say, which are spread from one person to another by contagion, such as small-pox and scarlet fever; and those which are generated by exhalations from decomposing matter, and when once thus generated may become more or less infectious, such as typhoid fever, yellow fever, and diphtheria. It is to be regretted that a practical *brochure* should have contained this statement, as it may lead persons to suppose that typhoid fever and diphtheria are comparatively non-infectious, and are self-generated, whilst the most advanced sanitarians hold different opinions, and believe that typhoid fever and diphtheria are spread by infective matter in the same way as scarlet fever and small-pox, although they are not so contagious. He then states that, as the virulent matter of communicable diseases consists of solid particles, all we have to do is to expose it to agencies capable of destroying its specific infecting power, which he proposes to do by carbolic acid and sulphurous acid, devoting a considerable space to their proper mode of application, especially carbolic acid, which he truly says is generally used in too small quantities, and far too diluted. Other disinfectants, copperas, chlorine and its combinations, including chloride of lime and Burnet's fluid, permanganate of potash (Condy's fluid), vinegar, camphor, terebene, sanitas, the smoke from burning wood, and dry heat, are also considered.

As carbolic acid is so generally employed, we may as well epitomise the author's remarks. He prefers the use of No. 4 acid (being less offensive than No. 5, which contains cresylic acid), in the proportion of four ounces to one gallon of water, as a less strength is insufficient. This solution should be used for disinfecting the discharges from, and the infected clothes used by, the sick, the floors, and every surface on which an infected substance may fall. In making this statement, although he only repeats the opinions long since expressed by practical sanitarians, yet it is one which is too often forgotten even by sanitary officers, instances of which he quotes in his book. After recovery of the sick, he advises burning four pounds of sulphur in the room, keeping it closed for five or six hours, and then admitting the external air very freely. This quantity is in excess of that ordinarily employed. Green copperas is advised for drains in the proportion of a pound and a half to a gallon of water. Chloride of lime is recommended to be used only by steeping clothes in a solution and hanging them up, when the chloride slowly yields hypochlorous acid, which is a deodorant. The rules to be observed by nurses in charge of districts during the prevalence of infectious diseases are very clearly given, and, when strictly followed, would doubtless do much towards stamping out an epidemic; indeed, Mr. Timins gives a number of instances in which small-pox, scarlet fever,

and diphtheria, were prevented spreading from the houses in which they first appeared by the action of the disinfecting nurses.

Potable Water. By CHARLES EKIN, F.C.S. J. and A. Churchill. London: 1880.

This is an exceedingly able and well written little manual, dealing with the conclusions to be drawn from the chemical analysis of drinking-waters. The question has already been discussed in detail, both at the annual meeting of the British Medical Association last year, and at the Sanitary Science Congress at Croydon.

Mr. Ekin must be congratulated on the terse and forcible manner in which he exposes the fallacies which may result from a mere chemical examination, and the honesty with which he recommends that in disputed cases 'the matter should be relegated to those who are alone competent to give an authoritative opinion, viz., those who, practising medicine, have made hygiene a special study'.

We agree with Mr. Ekin on the value he places on the different constituents usually sought for in the chemical analysis of water, and the utter absurdity of pronouncing one water pure and another 'vile', for the simple reason that the latter contains six times as much albuminoid ammonia as the former, or, as Mr. Ekin so well states it, 'six typhoid germs are harmless, while nine would be hurtful'. There is one point, however, which we regret Mr. Ekin has not entered into more fully, possibly because, as he tells us, 'the microscope only affords additional evidence in cases where the evidence is otherwise already complete'. We unhesitatingly state that an accurate microscopic examination of the sediment of a water submitted for analysis is absolutely necessary, and that morphological impurities can be detected by the microscope when chemical analysis failed to isolate these.

As an example, we may quote as a parallel case to that given by Mr. Ekin, at p. 9, the following:—Typhoid fever appeared in a family living in a semi-detached house; one case ended fatally. The well which was common to both houses was suspected, and carefully examined. Chemical analysis gave no evidence of organic impurity; there was no free ammonia, and the albuminoid ammonia present amounted to 0.0488 parts per million; but on careful microscopic examination of the sediment we found, striped muscular fibre of fish, white fibrous tissue, wheaten starch cells, linen and cotton fibre, dyed wool, pine fibre, knotted masses of paper, disintegrated and broken up, in fact, distinct evidence of fæcal matter percolating into the well; we may add that this water was examined by a public analyst, and reported on as pure and fit for dietetic purposes. We cannot but think a like examination would have disclosed a similar state of things in the very remarkable case Mr. Ekin has given.

We have perused this little work with very great pleasure, and we may add profit. It is a contribution from the pen of one who has had large opportunities of observation, and in placing the results of his experience before hygienists, he has done incalculable good. It is a work which ought to be in the hands of every medical officer of health; and, indeed, we might add every medical practitioner.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

VENTILATION OF SEWERS AND DRAINS.

I am again amused at the communication from 'J. R. T.' at page 480. He refers to the publication by him in March 1880, of the putting in of a sewer ventilating pipe beyond the drain trap as his 'views', and that I had 'abused' them.

Will you permit me to state that in 1873, if not before then, I published that idea with illustrations, and instead of 'abusing' the principle I have often acted upon it during the last seven years at least. The plan of carrying out the principle shown by 'J. R. T.' is what I object to, and consider not only incomplete but even bad so far as it goes, and especially his improved and corrected plan illustrated on page 397. In this latter case he shows an old-fashioned mason's trap (which looks like a broken-down wheelless cab stranded on the footpath) lengthwise, close alongside the wall of the house. This is surely courting dampness and danger too with a vengeance.

He tells us as an excuse for this foolish way of doing the work that 'the authorities of the town' where he is writing approve of this plan and also prefer mason's-built traps to ventilating fire-clay siphon traps. If such be really the case all I can say, as a householder, is:—Save us from such 'authorities.'—Well-meaning but inexperienced or short-sighted men they seem to me to be, reminding one of our anti-vaccinators.

I would again point out to 'J. R. T.' that the high 'pressure' of air in the sewers which he has twice referred to is in ninety-nine cases out of a hundred purely imaginary, and more especially if the sewers are ventilated in the middle of the streets. Moreover, while 'J. R. T.' has provided for ventilating the sewer, he has not made proper provision for ventilating either the house drain or soil-pipe, ventilation requires an inlet as well as an outlet, but when we look at the drawing on page 361, no provision for the inlet of fresh air is shown! This style of doing things by halves is common to all *apprentices*, and to the generality of sanitary dabblers when they work without some master mind to guide them. 'J. R. T.' is wrong in his statement at page 361 that "these sewer ventilating pipes would prevent the accumulation of noxious gases in the drains.' This is the assertion of an ignorant 'apprentice' with no experience. I can give many examples in practice to prove the opposite. I am not 'a veteran-sanitarian of the old school' as 'J. R. T.' at page 480 styles me, but rather fancy one of the newest of the new school.

In concluding I would respectfully ask 'J. R. T.' to tell us the name of the town where the authorities act as he says they do? Possibly what they really do is to object to the old-fashioned non-ventilating fire-clay trap, and rightly to, and they may not have seen the newer ventilating style.

A MASTER TRADESMAN.

THE HEALTH OF SANDOWN.

A rumour being current that there is 'a great deal of sickness at the Isle of Wight', and that 'several cases of typhoid fever' have occurred, 'one fatal case at Sandown', will you allow me the medium of your columns to give an unqualified denial to such report as regards Sandown? The town is in its usual healthy

condition. There has been no case of typhoid fever. The death-rate during the last ten years has averaged 14 per 1000 including, and 13 per 1000 excluding, visitors. For the last three years the death-rates have been 14, 14, and 11.3 per 1000 including, and 11.8, 10.8, and 10.6 excluding, visitors. In the interest of the Island generally, and of Sandown in particular, during the on-coming season, I beg you will publish these facts and figures. JAMES NEAL, M.D.,
Medical Officer of Health.

Sandown, I. W., June 1880.

THE HEALTH OF BLACKPOOL.

On page 307 of the SANITARY RECORD for February you remark that you should like to see Blackpool on your list of places sending monthly reports. Now there is no reason why you should not, but the caprice (may I so call it) of the Medical Officer of Health, Dr. Leslie Jones. He is possessed of all the data requisite, receiving regular returns from the Registrar, and, according to the sanitary clause in our new act, supposed to have been introduced by himself, reports from all the medical men in the place of every infectious case as soon as a knowledge of its nature can be arrived at, and which reports they are compelled to render to him under a £10 penalty. I think all ought to thank you for calling attention to this want of zeal in the right direction, for it is indirectly most injurious to the place, leading many to suspect that we have something to conceal, whereas our state of healthiness is something extraordinary, if the long quarterly reports of the Medical Officer of Health in the leading local paper are intended to be taken literally.

ONE WHO IS DEEPLY INTERESTED IN THE GOOD NAME OF BLACKPOOL.

Blackpool, July 6th, 1880.

THE HEALTH OF DEVONPORT.

In your notice of my report of the epidemic of measles in this borough, you rightly say there must be some reason for the exceptional mortality. In a later report to the Sanitary Committee, I have said that it is my opinion it is largely due to the peculiar mode of stowage of the inhabitants. The plan usually adopted is for one person to rent a house much too large for him, which he immediately proceeds to let out to various families; sometimes one family to each room. This plan is destructive of all privacy and possibility of isolation, as the rooms are close together, and the stairs and passages are in common. It is easily conceivable that this plan presents unusual facilities for the spread of any infectious disease.

Another reason is the diminished vitality and power of resistance to morbid influences induced in young life by the prolonged absence of sunlight last year, and the great amount of rain.

I can find no other adequate cause to account for the mortality; it is independent of locality and height above the sea level, which has often been found to be a powerful factor in difference of mortality in other epidemics elsewhere.

My experience teaches me that the crying need of the age is proper dwellings for the artisan class and poor, and I believe one-tenth of the agitation which we see made about extension of franchise and repression of liquor traffic, if it had been diverted into this channel of inquiry and action, would have done infinitely more towards bettering the condition of the people (to say nothing of stamping out infectious diseases) than we can hope to see effected by these well-meaning reformers. Humanise the masses by housing them as human beings, and you will increase their self-respect, their sobriety, and their intelligence. J. MAY, Junr.

Borough Sanitary Office, Devonport,
June 24, 1880.

NOTES ON EPIDEMICS.

[We propose to give from time to time, under this heading, such facts as we can glean from reports of health officers and from other sources as to the etiology and spread of infectious diseases as observed by local investigators. It is highly important to codify these local experiences, but the task has never yet been attempted. We would venture to express a hope that this column may eventually be found of considerable assistance in this regard, and we earnestly invite all medical officers of health to favour us with their experiences. We shall, moreover, be glad to give space, under this heading to discussions on the causation of epidemics, especially of those diseases the origin of which is still obscure.—ED.]

THE SPREAD OF TYPHOID FEVER.

IN 1878 a considerable outbreak of typhoid fever occurred at Shrewsbury, some 250 cases being reported, twenty of which were fatal. The stress of the disease was in July, August, and September, though the greatest mortality was in the autumn months. The epidemic was not confined to any particular part of the town; but, as a rule, appeared in isolated centres, to some of which the disease was strictly limited, while others formed starting points of localised radiation, depending in some instances upon specifically contaminated latrines or lengths of sewers temporarily infected, and, in some cases, upon specifically contaminated pumps.

The causes of the epidemic may be summed up as due to the repeated establishment of foci of disease (primary causes) in localities where favourable local conditions (secondary causes) admitted the passage of infection into houses with the emanations from sewers or latrines, or by means of water. The primary causes of the foci in question Dr. Thursfield attributes to—(*a*) the revival, under favourable conditions, atmospheric and personal, of old germs which had lain dormant from previous attacks in imperfect sewers, collections of filth, or under other favourable conditions; (*b*) the drinking of Severn water, which careful investigation has proved to have been, in many instances, the primary cause of the outbreak. This is hardly to be wondered at, since, during a considerable portion of the year at least, the river was, as a matter of fact, receiving specifically contaminated sewage at various points above the intake of the water. Although many cases were secondary, and, therefore, quite unconnected with the Severn supply, no less than 58 per cent. of the cases drunk Severn water. A considerable number of the cases occurred in two of the public institutions in the town. One of them had been recently erected, and the other entirely renovated, though in neither case did the bye-laws of the borough apply. Certainly into one of these institutions, and possibly into both, some of the cases of fever were imported, whilst to add to the difficulty of defining the source, the inmates of both institutions used Severn water for all purposes. It is a matter of fact, however, that supposing the sewer to which the buildings were respectively connected to have become specifically contaminated (as happened in the case of each), and had the end in view been the specific contamination from the sewers of the air of the institution, the sanitary

arrangements of both might have been considered most ingenious for the purpose. In the one institution the range of latrines was, in spite of remonstrance and the existence of a better site, placed in a most confined situation in the basement story, on a very dead level with the sewer, and closely adjoining the kitchens. Much of the ventilation of some most important parts of the establishment is drawn in through the latrines, by the openings intended for latrine ventilators. In the other institution analogous arrangements were carried out, and here also, by importation and otherwise, there occurred a considerable number of cases of the disease.

THE SPREAD OF TYPHUS FEVER.

In a recent report Dr. Wallace gives a very interesting account of an outbreak of typhus fever at Greenock, which for some considerable time could not be satisfactorily accounted for.

In each of Dr. Wallace's monthly reports since the beginning of the present year cases of typhus have been recorded; but with regard to most of them no explanation could be given of their origin or connection with other cases till the 17th May, when, in consequence of private information conveyed to the inspector, the existence of typhus was discovered in a certain family (A). Inquiry in this case led to further discoveries which cleared up much of what had been previously obscure, and the gist of which may be stated shortly as follows:—On the same stair-head with the family referred to was another family (B), which included a lodger. This lodger had been regularly visiting a typhus-stricken family in Port-Glasgow towards the end of 1878. The consequence was that the disease was conveyed to two members of the family B, who sickened early in January. Some time afterwards a lodger, who was a mill-worker, became affected and continued bed-fast for a fortnight or more. Early in April the disease attacked a child of the adjoining family A, six members of which were in succession struck down, before the 17th May. But this is not all, for the head of family B kept what is called a *menage* or money club, and had in consequence frequent visits from, and intercourse with, persons who were members of the club, the result being that of the other cases registered during May, no fewer than eleven caught the disease directly in this way. It is to be feared that the whole series of disasters originating in family B has not yet been ascertained; for even during the week in which the report was made two other cases which had direct communication with family B were discovered. The patients being children, not much heed apparently was paid to them. The same was the case in family A. It was only when the head of the latter was struck down that medical aid was procured; and the whole of the mischief detailed would have been prevented had medical aid been called in by the head of family B.

PROPHYLAXIS OF SCARLATINA AND DIPHTHERIA.

Dr. E. M. Snow says, in his report as City Registrar of Providence, U.S.A.,—The occasional occurrence of scarlatina and diphtheria in the same house, and of both diseases, one following the other, in the same child, seem to indicate that the local causes of the two diseases are similar. We may safely say that impure air is one of the factors necessary for the propogation of either of the two diseases. We may also say, with positive certainty, that there is very much less danger of either scarlatina or diphtheria in those houses where the premises, and especially the sleeping rooms of the children, are free from the impure air arising from sink drains, cesspools and privy vaults. This fact, of which I have no doubt, ought to furnish a guide for immediate and efficient action on the part of parents and others.

DIPHTHERIA AND POLLUTED WATER.

In the course of an address to the American Medical Association, at Atalanta, Dr. Rochester, of Buffalo, said, in reference to an epidemic of diphtheria, which had come under his notice:—'When a startling discovery is made or announced, its influence is apt to be exaggerated, and its application is often extended to subjects with which it has nothing to do. This is doubtless the case with reference to impure water supply. It is credited with too many evils; but that it will increase and intensify disorders springing from other causes, and propagated by other channels, cannot be doubted. Of this a very remarkable illustration has been afforded in an epidemic of diphtheria in Geneva, N. Y., during the past winter. The village is delightfully located on the banks of Seneca Lake. It stands high for the most part, on a bluff forming the western shore, and has always been considered healthy. Diphtheria invaded it during the winter months, and was characterised with unusual tenacity and fatality, subsiding at times and then recurring with great violence.

'Investigation as to local causes was conducted by Prof. Breneman, of Cornell University, who found that while the water supply to some portions of the village was of the very best character, as that coming from the "White Spring", and which yielded only $\frac{3}{100}$ grains of chlorine to the gallon, the public pump on the corner of Main and Castle streets furnished 21 grains of chlorine to the gallon, exceeding the average of that furnished by the sewers of Boston and of some other cities. Other pumps and wells yielded 14, 12, 9, 8, 7 grains chlorine per gallon; and corresponding with the amount of chlorine was always a relationate quantity of albuminoid ammonia and of nitrates. Water from eighteen sources was examined, and thirteen were condemned.

'The disease was more prevalent and much worse in the localities supplied with the bad water than in the others, but was not confined to them. A practical remark of much value, pertaining to the modification and propagation of disease as gathered from the condition of the water supply, is made by Prof. Breneman, to this effect: "It shows the extent of soil saturation, and indicates the condition of the ground, the emanations and exhalations from which taint the air in which the families are obliged to live, and exposes them to a constant morbific agency."'

SCHOOL AND CHAPEL DIPHTHERIA.

A report of a doubly interesting kind has been lately presented to the Local Government Board by Dr. Ogle, on the subject of the causes of diphtheria prevalence. Two distinct outbreaks of diphtheria, one in the urban, and the other in the rural sanitary district of Holyhead, are dealt with in the report; and the causes of the spread of the disease, in each case, were entirely different. Both the districts seem to be neglected and filthy, the town especially, being excessively dirty. But while this filthiness may conceivably have had something to do with the

origin of the disease, it seems to have had but little to do with its spread. The outbreak in the town of Holyhead was chiefly confined to one part, called Kingsland, and the infection is clearly shown to have been disseminated by a small dame-school, the disease being almost entirely limited to children in attendance at this establishment. The description given of the school makes it by no means surprising that such a result should follow the importation into it of a case. The single schoolroom, which accommodated before the outbreak an average of thirty children, was 8 feet high, 8 feet wide, 11 feet long, with one small window; thus the total space, even without making any deduction for the bodies of the children and mistress, was no more than 704 cubic feet. The children must, therefore, have been packed almost as closely together as they had been sleeping in the same bed. The attendance, since the outbreak, had fallen from thirty to ten. Of the twenty who had ceased to attend, no less than nineteen could be accounted for as having had diphtheria, and of these nineteen six had died. The outbreak in the rural district was of a much more singular and puzzling kind.

The thirteen houses attacked were widely scattered over the country, and in several parishes, and curiously enough almost all of them were isolated farmhouses, two only being houses in a village. These farmhouses subsist almost entirely on their own produce, scarcely any article of consumption, excepting tea and sugar, coming from without, so that all notion of community as regards milk, water, food, could at once be discarded. The fact of so many farmhouses being attacked suggested two hypotheses, (1) disease among farm stock, and (2) direct and separate importation of infection from the market town. Neither hypothesis stood investigation. As regards the first, Dr. Ogle was assured, in answer to repeated enquiries, that there had been no disease among farm stock, whether horses, cattle, swine, or sheep: many lambs had perished from the cold, but nothing more. As regards the second hypothesis it would only be tenable if the men, who are the connecting links with the market town, had been the first persons to be attacked, which was not the case, unless, indeed, it be supposed that persons can carry the infection of diphtheria attached to them from a distance, and transfer it to others, without themselves suffering,—an opinion for which there is, at present, no good warrant. School attendance again, could have played no important part in the matter, for, strangely enough, in no less than nine of the thirteen houses, the first case was a person above school age, a most unusual proportion.

The casual and untraceable intercourse between individuals in ordinary rustic life appears from the experience of many outbreaks to play as a rule a very subordinate part in the dissemination of diphtheria, to be for instance much less effective than in the case of small-pox, measles, or scarlet fever. Though one can never exclude the possibility of such transmission, it is difficult to believe that it can have operated to any great extent in the present instance; for the houses concerned were very far asunder, their occupants were by no means intimate with each other, and the season had been adverse to friendly meetings; the severe cold which prevailed during the greater part of the outbreak having kept, as Dr. Ogle was again and again assured, the occupants of the farms as much as possible within their own premises. There had been no general gatherings for festive or other purposes, with one exception. This exception was attendance at places of worship. The Welsh are most devout and sedulous in this observance, and are divided into no few sects, each of which has its own several churches or chapels. These chapels are as a rule small, and, in such weather as prevailed, closely shut up during use, so that each attendant inhales in a more than ordinary measure the breath of the rest. Moreover, there is a custom of assembling together before or after service in the small room attached to the chapel, which becomes naturally the accustomed place for friendly chat and greeting. The possibility of transference of infection on these occasions is apparent enough, when once pointed out; but it did not occur to Dr. Ogle, until on inquiry in one of the farmhouses where diphtheria had been, he was assured by the mistress that none of the family had left the house for more than a fortnight before this illness, 'excepting to go to chapel'. On further inquiry it was ascertained that the first person attacked in this house had two days previously to the attack been to chapel, and had actually there conversed with a girl from a remote dwelling, who was still suffering from a sore throat, of probably diphtheritic character. The chapels are so numerous that it was plain that if any considerable proportion of these widely scattered houses were found to frequent the same place of worship, this fact would be a strong corroboration of the hypothetical channel of infection; the result was that out of the thirteen houses affected, no less than eight went to the same chapel, which was, moreover, attended by the family from the farmhouse first attacked, so that it is not by any means impossible that the infection may have spread by this agency from this house to the seven others. Again, one or two of the occupants of these eight houses, instead of going to the first named chapel, went exceptionally to another chapel, and amongst these was the girl before mentioned, who went to chapel while still with sore throat, and there came into contact with a woman from a ninth house, who fell ill a few days after the interview.

In seven of the nine houses, that have thus been shown to be connected by chapel attendance, the first case of illness was in a person above school age. This unusual proportion is in harmony with the hypothesis, for it would be the young children who would be most likely to be left at home when the bad weather rendered chapel attendance at a distance a difficulty. It may be objected that persons would hardly be likely to attend chapel while suffering from diphtheria. As a matter of fact it appears, from what has been said, that at least one person actually did so; but it is important also to insist upon the fact that the diphtheritic poison hangs about persons, and can be transmitted by them for a much longer period after apparent recovery than is usually supposed. On the whole, the evidence seems very strongly to favour the conclusion that chapel attendance was one of the main agencies by which the infection was transmitted.

Diphtheria in Llanddausaint Sub-district.—Llanddausaint sub-district is that part of West Anglesea that lies immediately opposite to Holyhead island. It consists of a number of small scattered villages and numerous interspersed and isolated farmhouses. The district is a low-lying tract of slightly undulating ground, with much bog in the depressions. It is much exposed to wind; the rainfall is heavy; and at the time of the late outbreak there was a prevalence of bitter cold weather.

The difficulty of obtaining information was even

greater in this sub-district than at Holyhead; for, to the obstacles which lay in the way in that case were added the facts that the houses in which diphtheria was known to have occurred were scattered over a very wide area, and that the persons from and concerning whom information was to be obtained could not, as a rule, speak English.

I heard altogether of twenty-three houses that had been attacked by the disease; and these, with one or two exceptions, were visited by me. They may be conveniently divided into two groups, there having been apparently two different centres for the outbreak. In the one group are the houses at and about Valley, which is the village nearest to Holyhead, and in most direct communication with it, being the next station on the railway. In the other group are the houses in the northern part of the sub-district, of which Llanddausaint may roughly be said to be the centre.

In neither part of the sub-district could I hear of any case previous to the month of December 1878; that is to say, until long after the outbreak had begun in the town of Holyhead. So that if, as one would naturally conjecture, the two outbreaks, that in the town and that in the rural district, were connected with each other, it would seem that the infection had spread from town to country, rather than in the contrary direction. And this view is supported by the fact that as regards the Valley part of the sub-district, the earliest cases of which I could get information were at the nearest point to Holyhead, namely, at the bridge which connects that island with Anglesea; the next cases being also in the interval between Holyhead and Valley, but somewhat nearer the latter; and the disease having appeared only after this at Valley itself.

In all, so far as my information reached, eleven houses were affected in the Valley part of the sub-district. These houses were all, with one exception, where two were contiguous dwellings, separated from each other by considerable intervals. They had neither milk, water, nor sewerage in common, nor other traceable direct connexion with each other. They did not frequent the same place of worship, the eleven houses going between them to six different chapels or churches. As regards school attendance the facts appeared to be as follows:—In three of the eleven families the first person attacked was an adult; in the remaining eight the first case was a child of school age. In one of these the child was not at any school, but was probably infected by a child living close by, and ill a few days before it. In six, the first case was a child at the Caerpwll school; and in one, a child at one of the two other smaller schools in the district. The Caerpwll school is the one to which by far the largest number of children go in this district; so that the fact that in six families the first case was a child from this school is not any very strong ground for supposing this school to have been concerned in the dissemination of the infection. Still, the fact remains, that in a large proportion of the cases there was this possible and not unlikely channel by which infection may have been transferred from one person to another.

The Corporation of Hertford have agreed, with the Rivers Purification Association, to continue the treatment of the sewage of that town, at an increased annual subsidy of £650, instead of £550.

A very favourable report of the health of Dover has been presented by the Medical Officer, showing the death-rate to be but 10.15 per 1000.

SANITARY INVENTIONS.

NEW URINAL.

Of the many sanitary improvements lately introduced in London, few are more generally useful than public urinals. We, therefore, draw attention to the one just completed and opened to the public in St. George's Road, near the Elephant and Castle. It has been erected by the order of St. George the Martyr Vestry Board, Southwark, to the specification of their surveyor, Mr. A. M. Hiscock, and constructed by Benjamin Finch and Co., of 181, High Holborn, W.C., to their design. It consists of a slate rectangular structure about 28 feet long, 6 feet wide, 7 feet high, enclosing within it a urinal with sixteen pews, also two water-closets at one extreme end, and a caretaker's lodge at the other end, there being two entrances at either side. The closets are kept locked, and admission obtained by a penny fee. It is lighted at night, internally and externally, by two large spherical lamps. The urinal is cleaned by a peculiar arrangement of water jets placed level with the roof and out of reach, which produces a continuous sheet of water from roof to floor, then washes the gutter beneath, and passes away through traps into the drains, and appears to act admirably. The floor is neatly tiled red and black, is non-absorbent, bright, and clean. The great objects the contractors seem to have had in view in the construction of this convenience are simplicity and absence of corners or receptacles of any kind to retain dirt, in which aim they have perfectly succeeded. It will be of great public utility, should the other vestries of London follow the example shown to them by the St. George's Vestry, and erect similar sanitary conveniences, not omitting the much-wanted closets, in the parishes under their jurisdiction.

NOTICES OF MEETINGS.

INTERNATIONAL CONGRESS OF HYGIENE AT TURIN.

The International Congress of Hygiene at Turin will be opened on the 6th of September, and will close on the 12th. The King, the Ministers, the Maire, the Prefect, and all the officials of the city will take part in it, and the Minister of Foreign Affairs invites all foreign governments to send delegates. A reduction of 30 per cent. on the railway fares will be allowed to visitors to the Congress.

STATISTICAL SOCIETY.

'HOWARD MEDAL.'

The following is the title of the Essay to which the Medal will be awarded in November, 1881. The Essays to be sent in on or before June 30, 1881:—'On the Jail Fever, from the earliest Black Assize to the last recorded outbreak in recent times.' The Council have decided to grant the sum of £20 to the writer who may gain the 'Howard Medal' in November, 1881. Further particulars or explanations may be obtained from the Assistant Secretary, at the Office of the Society, King's College Entrance, Strand, London, W.C.

The Council also acknowledge the receipt of the Essays in competition for the Howard Medal of

1880, on the 'Oriental Plague', under the following mottoes :—'Διοσδὲ Τελείετο Βουλή'; 'Mente Manûque'; 'Sur Espérance'; 'Quid non pro Patria'; 'Volans arsit arundo.'

The Title of the Essay for the Howard Medal of 1881 (Bronze, with £20 added), may be obtained on application to the Assistant Secretary of the Statistical Society (King's College Entrance), Strand, W.C., London.

SANITARY JOTTINGS.

Dr. Jackson, who incurred the displeasure of certain members of the Hexham Local Board, by the straightforward manner in which he sometimes had occasion to remind them of their duties and responsibilities during the past year, has been re-elected Medical Officer of Health to the Board.——Mr. Geo. Stevenson has been appointed Surveyor to the Local Board of the newly formed urban district of Madeley, Salop. There were twenty-one candidates for the office.——At the March quarterly meeting of the Beaumaris Town Council, a report was read from the district medical officer, calling attention to the low rate of mortality in the parish, there having been only eight deaths registered during the quarter. ——A movement has been set on foot in Bristol to convert the old graveyards around the parish churches of the city into ornamental grounds for the benefit of the inhabitants. Temple churchyard has thus been utilised at considerable cost.——The municipality of Prague has forbidden the wearing of dresses with trains upon the streets, 'because of the dust, injurious to the public health, raised by them'.—— Considerable excitement has been caused in the county of Durham by the disappearance of Mr. J. W. Spoor, Surveyor to the Durham Rural Sanitary Authority and Brandon Local Board. Mr. Spoor left his home several weeks ago with the avowed intention of going to London, but has not been heard of since. Mr. Spoor's absence has caused much anxiety to his friends; and several candidates for his situation are already in the field.——An epidemic of measles is prevalent at Spennymoor, near Durham. ——Newcastle-on-Tyne is sadly in want of a respectable mortuary—the only apology for such a place being a broken-down old building, in an out-of-the-way locality, destitute of convenience or comfort, and which never fails to provoke the unfavourable criticism of all who are called upon to visit it.—— A serious outbreak of scarlet fever has occurred at Craven, a district under the jurisdiction of the Skipton Rural Sanitary Authority. Offensive drains, and the drinking of water obtained from a pump placed close to a middenstead are set down as the cause, the gross carelessness and ignorance of the people themselves being contributory agents.——The vestry of St. James's Westminster, have resolved to dispense with contractors on all works in connection with sewers, drains, &c.; the work during the present year to be done by the vestry's men, under the supervision of the surveyor and a clerk of works.——In the House of Commons, Mr. Adam, in answer to Sir J. Holker, said that plans for ventilating and warming the new Law Courts had been adopted, and tenders for the work were being invited. Until they had decided upon them it would be unwise to give any general information.——The Council of the Society of Arts have awarded medals to the following gentlemen for papers read during the Session just terminated. Major-General H. Y. D. Scott, C.B., F.R.S., for his paper on 'Suggestions for Dealing with the Sewage of London'; Thomas Fletcher, for his paper on 'Recent Improvements in Gas Furnaces for Domestic and Laboratory Purposes'; and Professor Heaton, F.C.S., for his paper on 'Balmain's Luminous Paint'.——At a recent Meeting of the Teignmouth Local Board, Dr. W. C. Lake was unanimously re-appointed Medical Officer to the Board, the Chairman congratulating both Dr. Lake and the Board on the re-appointment. Mr. Burnett, one of the members of the Board, remarked that the great attention which Dr. Lake had paid to sanitary matters must eventually greatly benefit, not only the inhabitants, but also the property owners of the town.——At the Sydney Exhibition, Mr. G. Jennings has won the highest awards, viz., first for stoneware drain-pipes, etc.; first for hydrants and water-fittings; first for pumps; and first and special for sanitary wares.——It is stated that the interior circumference of the iron water-pipes in the city of Ely is becoming covered with a species of mollusc. The effect of this incrustation is seriously to obstruct the flow of water, by the roughness produced on the surface of the pipes, necessitating driving the engine much harder to give the same supply.——A portable crematory furnace, for cremating the bodies of persons who have died from infectious diseases, has been invented in the United States by Messrs. Kuborn and Jacques. It is designed for transport by road, and any kind of fuel may be employed.—— Mr. Alderman Ingledew, who is now in his ninety-fifth year, is still in active practice as a solicitor at Newcastle-on-Tyne.——At the Sydney International Exhibition, Messrs. Borwick and Son have been awarded the silver medal for the manufacture of baking powder, in addition to the four gold medals they have already received from other exhibitions.

A reference to page 31 will show the care exercised by Messrs. Woollams in the manufacture of their wall-papers. It will be seen that they preferred to incur the risk of pecuniary loss rather than suffer wall-papers, which they found, through no fault of theirs, to be manufactured with arsenical colours, to be sold to the public and thus be the possible cause of disease. Such a course of conduct is but in keeping with the high position attained in the commercial world by Messrs. Woollams, and is worthy of note and imitation by all firms concerned in the production of articles in which arsenical colours may be wrongfully substituted for the harmless but equally effective vegetable pigments.

The Baldock (Herts) Local Board have applied to the Local Government Board for an extension of their district. A good deal of fever, for so small a town, has at different times within the last few years been experienced at Baldock. Mr. Jenner, the medical officer of health, has frequently directed attention to the water-supply as a probable cause, and representations have been received from the Local Government Board on the subject. The Local Board, on the other hand, have had frequent cause for complaint of nuisances dangerous to health arising on the margin of their district, but which they had no power to deal with. This the Local Board consider to be a weak point in the sanitary arrangements of the town. They therefore seek for an extension of their district so as to include about 100 houses and a population of 500, which at present are just outside the Board's district.

ORIGINAL PAPERS.

ON SOME PREVENTIBLE CAUSES OF IMPURITY IN LONDON AIR.*

By DOUGLAS GALTON, C.B., Hon. D.C.L., F.R.S.

SANITARY Science is the science of counteracting the influences injurious to health which arise in the surroundings in which man is placed. It is a branch of science which is of higher practical interest to the community than almost any other science; because, without health there can be no happiness, no comfort, and but a very limited power of producing wealth. The field embraced in this branch of knowledge is already wide, and it increases daily. For whilst the various processes which are necessarily incidental to life, especially to life in crowded communities, contribute largely to that deterioration of air and water which is an important cause of preventible disease, new discoveries are daily made in the various branches of science which add to the knowledge of the evils from which our health suffers, and to the means of checking these evils.

It is a necessary feature of the vast progress which has been made of late years in all scientific investigations, that each of the various branches of knowledge demands a daily increasing amount of special treatment on the part of those who pursue them.

This is especially the case with sanitary knowledge, because the student of this branch of knowledge has to cull his facts from many branches of science. The physiologist determines what is a healthy condition of life; and by tracing out the causes of disease, shows how large is the amount of preventible disease. The chemist supplies facts relating to the impurities of air, of water, and of soil, and to the means of counteracting the evils arising therefrom; upon the laws of physical science depend the arrangements for warming and ventilating buildings. The meteorologist shows the influence of climatic variations upon health; conditions affecting the health of a locality dependent upon the nature of the strata on which it is situated, upon their water-bearing character, and upon the subsoil and similar matters, are derived from the geologist. The botanist traces out the effect of vegetation on climate and on health; the mathematician, and even the astronomer, contribute their quota; and in the various branches of applied science the sanitary student must draw knowledge from the medical man, from the mechanical and civil engineer, and from the architect; and he should possess a detailed knowledge of many branches of practical industry.

Whilst there are numerous subjects in each of these branches of knowledge which have no direct sanitary application, there are others of such importance that it may be said they form the foundation upon which the whole superstructure of sanitary knowledge rests. It is for the student of sanitary knowledge to search out the facts which bear upon his inquiry from each of the various branches of knowledge, and to correlate them into a harmonious and consistent whole.

Sanitary Science may be described as the offspring of preventible human misery, and its principles have been slowly and painfully collected during a long period, from a careful observation of disease and suffering, by persons who have preferred the study of facts to the more enticing but more fallacious creation of theories.

A large portion of the causes of preventible disease includes those various circumstances which, together, constitute the sanitary state of the dwelling and its surroundings, all of which are more or less under control; and in proportion to the extent to which these causes are removed, will the population be enabled to resist the occasional inroads of variable conditions connected with climate, epidemic prevalence, and the like conditions which we have not yet found the means of controlling.

The construction of healthy dwellings must take into consideration all those conditions included in the term Sanitary Science, with which engineers and architects are more especially concerned.

In all scientific progress there is first the age of ignorance and unbelief in the need or value of scientific discovery. This is followed by the age of theory—often very fanciful, and leading to much useless speculation. And finally, we arrive at the age of ascertained facts universally admitted and acted upon.

Sanitary Science has passed, like other sciences, through these phases. But whilst some of its branches are still passing through the tentative stage, in that branch which more especially concerns the engineer and architect, the main principles have been ascertained; and what is now required, in order to obtain adequate results, is to diffuse a knowledge of these principles throughout the community. It has been said that no scientific theory can be considered complete 'until it is so clear that it can be explained to the first man you meet in the street'. And undoubtedly, if sanitary knowledge is to be of avail in mitigating the bad health of any community, every member of that community must be conversant with the principles, and must be ready to act upon them continually.

The health of a community cannot be secured if this knowledge is limited to the educated few. For instance, there may be a large expenditure of money by the authorities of a town. The streets may be broad, handsome, and well drained; all the outward appearance of the town may be sanitarily satisfactory. But the sanitary arrangements often stop short at the threshold of the place where they are most needed. That which is visible may be made pleasing to look at, but that which is hidden inside the houses, which are the 'centres of habitation', may contain many preventible causes of disease, resulting from ignorance of the commonest principles of sanitation. On the other hand, an architect may design and construct a house, and an engineer may devise and execute a system of drainage on the best sanitary principles; but if those who live in the house, or who regulate the drainage works when completed, are ignorant of sanitary principles, the most perfectly sanitary house, or the best system of drainage, may become a focus of preventible disease.

The Government of a country takes measures to protect human life and property from violence and robbery; and it is contended that it is equally the duty of Government to take measures to arrest preventible disease, so as to diminish the destruction of human life which is caused thereby. But Government cannot check preventible disease by means of the police. The force to be used in suppressing preventible disease must be created out of the intelligence of the community. Laws may direct the public mind into the right channels; Government inspectors may

* The Anniversary Address delivered before the Sanitary Institute, on Thursday, 8th July, 1880.

assist sanitary progress by pointing out here and there a defect; but if the nation were to depend for sanitary progress on Government inspection, and on the laws which Parliament could pass, it is quite certain that, although possibly at first a higher uniform sanitary standard might be obtained than now prevails, beyond that there would be little sanitary progress. We should soon arrive at a stereotyped condition far behind that to which we shall attain by educating the people, and thus creating a rivalry of intelligence between the different portions of the community. Real practical progress can only be secured by the exertions of the individual members of the community.

A comparison of the Local Acts obtained by different towns shows the progress which is continually taking place in the sanitary intelligence of the community. This is illustrated by taking only one point, viz., the Registration of Disease. Several towns (notably watering places, or health resorts, in which self-interest in the matter is largely concerned) have obtained power in special Acts of Parliament to require the compulsory registration of infectious diseases. In this respect, these towns are in advance of the rest of the country; and similarly each year, as sanitary knowledge progresses, one town or another makes some step in advance, to be gradually followed by the rest of the country.

There is, moreover, each year, an increased necessity for sanitary precautions. The population of the country grows rapidly. Houses increase, and with them the sources of contamination spread over the whole country; consequently, it becomes more and more impossible for any member of a community to separate his interest from that of his neighbour. The villages grow into towns—the towns are continually increasing in size.

London contained less than a million inhabitants at the beginning of the century; it now contains above three-and-a-half millions. There was, at the beginning of the century, no town in the kingdom, except London, which contained as many as 100,000 inhabitants. In 1871 there were seventeen towns with more than that number. More than half the population of England lives in towns. It has long been demonstrated that the average death-rate of the urban population of England exceeds that of the rural population by about 5 per 1,000; and, as this urban population of England amounts to about 13,000,000, this means that 65,000 persons die every year in our towns, who would not have died had they been under the same conditions of health as the rural population. But it is necessary, in order to obtain results which can be usefully applied to sanitary improvement, that the average death-rate be analysed, and that the facts be brought home, not only to particular districts, but to the several streets, and even to individual houses.

In these matters an average may become, sometimes, necessarily misleading. For instance, the density of population of the metropolis is stated to be 42 per acre. But the crowded district of St. Giles has a population of 300 per acre; whereas Eltham has a population of little over 1 person per acre.

Similarly, whilst the death-rate of London, in a recent year, was 23.8 per 1,000, that of the district of St. Giles was 27 per 1,000, whilst the death-rate of Eltham was barely 17 per 1,000. Nor, when sanitary conditions are carefully observed, can the density of population be taken as any index of the death-rate. Certain model lodging-houses, affording a density of 860 and 1,140 persons per acre, have yielded death-rates not exceeding from 16 to 18 per 1,000.

In view of the necessity of localising disease causes, and in order to obtain information to guide the community in the pursuit of more active measures for the prevention of disease, Mr. E. Chadwick, with his usual indefatigable energy, has analysed the death-rates of different classes of persons in populous districts. The following facts are derived from his analysis for the inhabitants of Westminster:—Out of every 100 children born in the class including gentry, professional men, etc., the deaths are 6 in the first year, and 9 within five years; whilst of the wage classes, out of every 100 children born, 22 die in the first year, and 39 within five years; and out of every 100 children of tradesmen and shopkeepers, 21.9 die in the first year, and 38.4 died under ten years of age.

Moreover, whilst the mean age of the first-class, viz., gentry, professional men, etc., is 55.8 years, the mean age of tradesmen, shopkeepers, etc., is only 32 years, and the mean age of the wage classes is only 29.8 years.

A visit to the crowded districts of Westminster shows that, although many of the shopkeepers may possess good houses over their shops, they do not occupy them. They generally let them to lodgers, and themselves live in back rooms, and even cellars and basements, exposed to the influence of air which cannot circulate, and which is polluted by emanations from sewers and gas-pipes underground, from the ill-cleansed surface of streets, and from the effects of combustion of coal and gas. The wage class is subjected to similar influences.

The figures given above imply more than the loss by death. The larger death-rate is accompanied by sickness and low health, which means diminished enjoyment, diminished usefulness, diminished power of obtaining the necessaries of life, and a diminished wealth-producing capacity.

Without laying too much stress on these statistics, they all point in the same direction, viz., that in proportion as there is more movement and a more complete circulation of air round the dwellings, so is the healthiness of the inmates increased.

The greater unhealthiness of towns is largely due to the too close proximity of the dwellings, the consequent absence of circulation of air, and the saturation of the subsoil with impurities passing into it from the closely occupied surface.

The subsoil of all large Indian cities has been saturated with the filth of generations, just as the subsoil of large cities in ancient times had been saturated. From this saturation these ancient cities became foci of disease, and were abandoned.

Many large cities in India contain saltpetre factories, the nitrogen being derived from the previous contamination of the soil with decaying animal matter.

In London, careful surface paving and good drainage diminish this evil, but notwithstanding all that is done, the air of London receives impurities from emanations from sewers, and house refuse, and street mud.

It is noteworthy that the mud from a paved street in London was found, on analysis, to contain nearly 90 per cent. of horses' dung; the mud on the new wood pavements consists almost entirely of horse dung. The wood pavement laid down in Regent Street, about thirty years ago, was removed because it had become so saturated with ammonia that the emanations tarnished the plate in silversmiths' shops.

Each year the description of pavement is being improved, and the area of paving, in some form or other, is being extended. In proportion as scavenging is more carefully carried on, the impurity in the

air from this cause will diminish. If our water-supply sufficed to enable the streets to be washed every morning, as is done in many parts of Paris, the impurities of London air, derived from the dirt of the streets, would be greatly diminished.

Stable manure gives out a large quantity of ammonia; indeed, this, as well as the house refuse, is allowed to accumulate too long in ash-pits and dust-holes in many parts of London. All refuse should be removed every day, and it should be removed in carefully covered vehicles. This latter point is too much neglected. The dust is generally removed in open baskets, and emptied into open carts, in a manner which seems to have been designed for the purpose of scattering it as much as possible into the surrounding atmosphere.

The air also receives impurities from the breathing of the inhabitants, and from imperfect combustion of the fuel consumed.

The oppressive character of London air is probably largely due to the enormous consumption of coal. The presence of sulphuric acid in London air is very noteworthy. Numerous analyses of various sorts of coal showed, that whilst there was a mean of 1·7 per cent. of sulphur in these several coals, no more than 0·2 per cent. remained in the ash. Therefore, the burning of 1,000 tons of these coals sends fifteen tons of sulphur into the air as sulphurous acid, and this soon becomes converted into sulphuric acid; this is sufficient in quantity to render the rain-water which is collected in towns very frequently acid. The quantity of coal estimated to be consumed annually in London is about 5,000,000 tons, and London air contains about nineteen grains of sulphurous acid in a cubic yard of air. It has been sometimes contended that this class of impurity may have some neutralising effect on the large amount of organic matter present in London air from the other causes of impurity already alluded to. However this may be, the same argument cannot be advanced in support of retaining in London air an enormous quantity of soot, fine carbon, and tarry particles of coal, which is given off in combustion, and which has been estimated to amount to nearly one per cent.

In an article in the *Quarterly Review*, in 1866, Dr. Percy said:—'In London we breathe coal smoke, our buildings are made hideous by coal smoke, and not only do our hands and faces contract dirt, but soot finds its way to our lungs. Plants struggle for existence in the London parks.' If our windows are opened, smuts penetrate into our rooms; if we trust to ventilating openings, the incoming air is so loaded with soot that it blackens everything in the vicinity of the aperture. This was the condition of things in 1866; it is worse now.

The darkness which prevailed in London last winter was to a large extent due to the smoke-polluted air. In the open country, the atmospheric currents continually disperse the various impurities thrown into the air, and so long as air is in movement out of doors, the products of vegetable and animal waste are continually removed from the air by oxidation. Much of this oxidation is probably due to the action of ozone, and would not be effected by ordinary or inactive oxygen.

Ozone is oxygen in an altered or allotropic condition, and appears to be formed by the passage of the electric spark through dry oxygen, or by the slow oxidation of phosphorus and other essential oils in presence of moisture. Ozone is insoluble in water.

Ozone is rarely, if ever, absent in fine weather from the air of the country; but it is more abundant, on the whole, in the air of the mountain than of the plain. It is also said to occur in larger quantity near to the sea than in inland districts. It has been found to an unusual amount after thunderstorms.

Ozone is rarely found in the air of large towns, unless in a suburb when the wind is blowing from the country. An experiment made last autumn, at the end of the pier at Brighton, showed that ozone was present in the air when the wind was blowing off the sea, but the presence of ozone was not apparent when the wind blew directly over the town. It is only under the rarest and most exceptional conditions that ozone is found in the air of even the largest and best ventilated apartments. It is, in fact, rapidly destroyed by smoke and other impurities which are present in the air of localities where large bodies of men have fixed their habitations.

The permanent absence of ozone from the air of a locality may be regarded as a proof that the air is adulterated air. Its absence from the air of towns and of large rooms, even in the country, is probably the chief cause of the difference which every one feels when he breathes the air of a town or of an apartment, however spacious, and afterwards inhales the fresh or ozone-containing air of the country.

The movement of the air is stated in the Registrar-General's reports to be at the rate of about twelve miles an hour, on an average, or rather more than seventeen feet per second. It will rarely be much below six feet per second.

A collection of houses presents more or less of an obstruction to this continual movement. If an observer stands on a hill over-looking London on an ordinary day, he will perceive that a cloud covers London. This cloud is composed of impurities. The observer will see the high church spires, the Victoria Tower, the Hankey Mansions, penetrating through this cloud. At 200 feet from the ground the air is comparatively pure; at 600 feet it would probably be quite pure. Even at lower levels an observer will find, during a fog, a less dense atmosphere as he ascends from the surface. Thus, it frequently happens in a fog, that, whilst on the level of a street it is impossible to see from one side of the street to the other, on the third or fourth story of a house the opposite house is clearly visible. A resident in the upper part of a lofty London house will thus have the chance of a purer air than the resident on lower levels.

The fresh air supplied by General Morin's system of ventilation to the French Chamber of Deputies is drawn down from a height of sixty mètres, or nearly 200 feet. It has always seemed remarkable that the fresh air for the Houses of Parliament is not drawn from the Victoria Tower.

But the conclusion at which I wish to arrive is, that whilst great efforts have been directed towards the improvement of the air of London by the removal of the refuse, that is by improved scavenging, and by the creation of a vast drainage system, which have both been the result of municipal management, very slight efforts have been made in the direction of purifying the air of towns from smoke. This is a matter which must depend rather upon the efforts of the individual householder than upon the centralised action of the local authorities. The smoke from the chimneys of manufactories has been reduced to a certain extent, but the smoke from the increasing number of private and domestic fire-places continues unchecked; and, under the present system of warming houses, the colder and more raw the weather is, the greater must be the quantity of smoke and soot

driven into the atmosphere of our towns. The ordinary open fire consumes a far greater amount of fuel than is necessary for warmth, and almost all ranges used in kitchens consume far more coal than is required for mere purposes of cooking.

In order to appreciate the waste of fuel which takes place with the ordinary open fire-place, it may be assumed that one pound of coal is more than sufficient, if all the heat of combustion is utilised, for raising the temperature of a room 20 feet square and 12 feet high to 10 degrees above the temperature of the outer air. If the room were not ventilated at all, and the walls were composed of non-conducting materials, the consumption of fuel to maintain this temperature would be very small; but, in proportion to the change of air of the room, and to the escape of heat through the walls, windows, ceiling, etc., so would the consumption of fuel necessary to maintain that temperature increase. If the volume of air contained in the room above mentioned were changed every hour, one pound of coal additional would be required per hour to heat the inflowing air, so that, to maintain the temperature at 10 degrees above that of the outer air during twelve hours, would require 12 lbs. of coals, and it is stated that Dr. Arnott's smoke-consuming fire-place does not exceed this consumption; but the fire in this form of grate is generally dull.

The principle of the ordinary open fire-place is that the coal shall be placed in a grate by which air is admitted from the bottom and sides to aid in the combustion of the coal, and an ordinary fire-place, for a room of 20 feet square and 12 feet high, may contain from about 5 to 20 lbs. at a time, and, if the fire be kept up for twelve hours, probably the consumption will be above 100 lbs.; in other words, the consumption may be assumed at from 8 lbs. to 10 lbs. of coal an hour.

It has been computed that seven-eighths, and even more, of the heat capable of being evolved from coal, is carried up by the chimney; of this, about one-half of the heat generated by the fire is supposed to be carried off with the smoke; about one-fourth is carried off in the constant current of the warmed air of the room, into the chimney; and the remainder of the loss of heat is represented by the unburnt particles of carbonaceous matter in the smoke. Therefore, under favourable circumstances, the coal consumed may be taken at ten times, and, in many cases, a much larger quantity than is necessary for producing the required warmth. The unburnt carbonaceous matter or soot, which, on the above computation, would amount to about one-eighth of the coal used, passes into the atmosphere, resting, in a cloud of finely-divided particles, over London.

But the open fire-place presents many advantages. It is a very powerful engine for ventilating a room. The volume of air which will pass up the ordinary chimney from an open fire will vary from 15,000 to 40,000 cubic feet per hour; or in a room twenty feet by thirty feet, and twelve feet high, the air would be completely renewed from twice to more than six times in an hour.

The character of heat given out by the open fire presents advantages. When a room is warmed by an open fire, the warming is effected by the radiant heat from the fire; the rays from the fire pass through the air without sensibly warming it; the radiant heat warms the walls and furniture, and these impart their heat to the air. Therefore, the walls in this case are warmer than the air. On the other hand, where a room is heated by warmed air passed through flues into the room, without any source of heat in the room itself, the air imparts its heat to the walls. The air is thus warmer than the walls.

Consequently, in two rooms, one warmed by an open fire and one by hot air, and with air at the same temperature in both rooms, the walls in the room heated by hot air would be some degrees colder than the air, and therefore colder than the walls of the room heated by an open fire; and these colder walls would therefore abstract heat from the occupants by radiation more rapidly than would be the case in the room heated by an open fire. And to bring the walls up to the same temperature in the former case, viz., in the room heated with hot air, the air of the room would require to be heated to an amount beyond that necessary for comfort, and therefore to a greater amount than is desirable on sanitary grounds, seeing that warmed air contains less oxygen than cooler air. It may be partly owing to the feeling of greater comfort experienced in the use of the open fire, with its radiant heat, that the large money saving which would result from a system of warming framed upon the principle of utilising the whole of the heat generated by the fuel, and of avoiding the emission of so large a quantity of smoke, has not proved a sufficient inducement to the public to give up the open fire and adopt a more economical arrangement. On the other hand, although some change is necessary in the interests of the occupants of large towns, and especially of the metropolis, the question seems to be scarcely one which can be dealt with by legislation. It is rather one which requires to be elaborated by discussion, and the adoption of any change must depend upon the co-operation of the individual members of the community.

Numerous suggestions have been made for getting rid of smoke. In 1877, Mr. Spence proposed to convey the smoke and the sewage of towns together to a distance from the town, and to convert the solid matter into manure, and disperse the gaseous matter in the atmosphere by means of a lofty shaft. Dr. Percy suggested that in building the mews at the backs of London houses all the chimneys should be carried to one lofty stack, so as to avoid the emission of smoke close to the drawing-rooms of the principal houses; and, similarly, that the chimneys of all houses in a new street should be carried to a central stack. Mr. Spencer Wells, some years ago, suggested that a smoke-rate should be levied on all householders, to be used in arrangements for removing the smoke to a distance. But, without resorting to these combined systems for the removal of smoke, the abolition of the open fireplace, and improved methods of providing heat for cooking, would do much to diminish the increasing inconvenience which is arising from smoke in the metropolis.

The consumption of fuel would be diminished, and the creation of smoke prevented, by supplying hot air to all the rooms of a house from a stove in the basement, there being only one fire, instead of a fire in every room. Or, if it were preferred to continue to warm each room separately, a large economy in fuel, and a consequent diminution of the smoke sent into the atmosphere, would result from the use of stoves on the German plan, modified to admit fresh warmed air. A beautiful adaptation of these stoves to English wants has been made recently by Messrs. Doulton. Both these plans are open to the objection that they do not supply the radiant heat necessary for comfort.

Iron stoves highly heated, on the other hand, would supply a proportion of radiant heat, and a properly

constructed stove with a long flue would utilise a very large proportion of the heat given out by the coals. But a highly-heated iron stove is liable to injure the air, especially air containing organic impurities.

Heat, with a flame which would warm by radiation, might be produced by mineral oil. This form of heating has been introduced, during the last two or three years, amongst the poorer classes for cooking, and even for warming in very cold weather. It would be easy to devise a special apparatus, ensuring almost complete combustion of the oil, and adapted to domestic use on a large scale; but I am not aware of any form of apparatus having yet been adapted to this purpose; and in any such apparatus on a large scale it would be especially necessary to guard against the danger from fire.

Coal-gas affords a convenient fuel ready to hand. The relative value for heating purposes of coals at 25s. per ton, gas at 4s. per 1,000 cubic feet, and petroleum at 1s. 6d. a gallon, would be, in the case of coals consumed under a boiler, and the gas and petroleum burnt in the room—petroleum being one penny, gas would be about two-thirds of a penny, and coal about one-fifth of a penny. If the petroleum and gas were burnt as before, and if the coal were burnt in an iron stove with a long flue pipe, by which almost all the heat could be utilised, the proportionate value for the coal would only be one-tenth of a penny, as compared with one penny for petroleum and two-thirds of a penny for gas. Although the immediate cost of gas, in proportion to the effect which could be produced, would thus be larger than the cost of coal, yet, in a properly constructed apparatus, nearly the whole effect of the gas could be utilised, and the consumption of gas or oil ought to commence and terminate with the operation; that is to say, the fires could be used for exactly so long as required, and then extinguished, whereas a coal fire is maintained for a long time to perform only occasional work. The use of gas or oil would also economise in other ways. The labour of carrying coals would be saved, and the dust and dirt arising from coal and coal ashes, and the injury caused thereby to furniture, would be avoided.

For the transference of heat from one fire to all parts of a house, hot-water pipes and steam pipes are usually the most convenient and most economical arrangement. In the use of hot-water or steam pipes for heating purposes, the higher the temperature to which pipes are heated, the greater is their comparative effect on the warming of air. Thus, pipes heated by hot water under pressure convey heat to the air with greater rapidity than pipes heated by hot water at low pressures; and steam pipes are more effective than hot-water pipes; and steam at a high pressure is more effective than low pressure steam. One advantage of heating by steam, or by water under considerable pressure, is the high temperature obtained in the pipes, and the consequent radiation of a larger proportion of heat to the walls of a room than takes place with pipes heated under ordinary pressures.

By Perkins' system, the water is heated under considerable pressure, and a higher temperature is thus obtainable than with ordinary pressures. In its simplest form, the apparatus consists of a continuous or endless iron tube, of about one inch in diameter, closed in all parts, and filled with water. About one-sixth part of the tube is coiled in any suitable form and placed in the furnace, and the other five-sixths, forming the heating surface, are heated by the circulation of the water, which flows from the top of this coil, and, cooling in its progress through the building, returns to the bottom of the coil to be re-heated. The temperature depends on the proportion of the surface of pipes exposed to the fire to that used as heating surface. A temperature of as much as 300 degrees Fahrenheit is usually arranged to be obtained in the tubes.

Steam is specially applicable for heating on a large scale. It is in use in the Houses of Parliament. The most interesting application to which notice has recently been directed, has been described by Mr. George Maw. He states that steam has been supplied, at Lockport, in the United States, on a considerable scale, from a central fire, to a large number of houses, for domestic purposes, to avoid the necessity of having separate fires in each house.

The following is the account as given by Mr. Maw:—'Two hundred houses were heated from the central supply through about three miles of piping, radiating from the boiler-house. This building contained two boilers, each 16 ft. by 5 ft., and one boiler of about half the size. The steam during the winter was maintained at a pressure of 35 lbs. to the inch, with a consumption of four tons of anthracite coal in twenty-four hours. This boiler pressure of 35 lbs. was maintained through the entire length of three miles of main piping, up to the points of consumption, at each of which there is a cut-off, under the control of the consumers. The first 600 ft. of mains from the boilers are four inches in diameter. There are 1,400 feet of three inch pipes; 1,500 feet of two-and-a-half inch pipes; and 2,000 feet of two inch pipes. The supply pipes from these mains to the houses are one-and-a-half inch in diameter, and within each house three-quarter inch pipes are used. In addition to the cut-off tap from the main, under the control of the consumer, there is a pressure-valve, regulated to a five lb. pressure, under the control of the company, and beyond this is an ingeniously constructed meter, which not only indicates the total consumption in cubic feet of steam, but also the quantity of steam used in each apartment. At each 100 ft. of main an expansion-valve, like an ordinary piston and socket, is inserted, allowing an expansion in each section of 100 ft. of one-and-three-quarter inches for the heat at 35 lb. pressure. No condensation occurs in the mains. They are covered with a thin layer of asbestos paper next the iron, then a wrapping of Russian felt, and are finally wrapped round with Manilla paper, like smooth light brown paper, and the whole encased in timber, bored out three-quarters of an inch larger than the covered pipes, and laid along the streets like gas pipes. The distribution of heat in the apartments is by means of radiators, consisting of inch pipes thirty inches long, placed vertically, either in a circle or in a double row, and connected together top and bottom; they are furnished with an outlet pipe for the condensed water which escapes at a temperature a little below boiling, sufficient in quantity for the domestic purposes of the house, or it may be used as accessory heating power for horticultural and other purposes. The laid-on steam was used for cooking purposes, for boiling, and even baking. In a house three-quarters of a mile from the boiler a bucket of cold water could be raised to boiling heat in three minutes, by the passage of steam through a perforated nozzle plunged into the bucket. As in the case of gas supply, the Steam Supply Company lay their pipes up to the houses, the consumer paying for all internal pipes, fittings, and radiators. In a moderately-sized eight-roomed house the expenses of these amounted to 150 dollars,

or a trifle over £30; and in a larger house, with more expensive fittings, 500 dollars, or about £100. The working expenses consist of but little more than the coal, and the wages of two firemen.'

This plan would appear to be eminently adapted to be applied as an experiment in rooms of the new model buildings, such as those of the Artisans' and Labourers' Dwellings Co., or the Industrial Dwellings Society, or the Metropolitan Association for Improving the Dwellings of the Labouring Classes. In the buildings of these societies, of which all the tenants are under one management, the introduction of such a system would appear to command the best chances of success.

In considering the various modes of applying heat, it must be recollected that the higher the temperature of the heating surface the larger is the proportion of radiant heat which passes off, and therefore the more does the mode of heating approximate to that of an open fire. At the same time, any of these modes of heating will be far behind the open fire in diffusing radiant heat.

One of the operations of the radiant heat from an open fire is to warm the walls, floor, and ceiling, on which the rays impinge, and which do not, therefore, abstract so much heat by radiation from the occupant of a room as they would if they remained cold. It would, therefore, be worthy of consideration whether it would not be desirable, instead of simply introducing hot-water or steam pipes into a room, to warm a room by means of the walls and floor, somewhat in the old Roman plan; for by this means the discomfort of walls colder than the air of the room would be avoided.

At the recent Exhibition of Sanitary Apparatus at the Society of Arts, a method of warming a large surface of corrugated iron plates by means of steam was exhibited, which might be applied to warming walls. An enamelled surface emits heat more rapidly than an iron surface, and therefore enamelled iron plates might be found a convenient form of wall surface for this purpose. It is probable that, if attention be directed to this question, many convenient methods of warming the walls will soon be suggested.

In all systems of warming which discard the open fire, ample provision must be made for ventilation or change of air.

Independently, however, of these methods of avoiding the large consumption of fuel and consequent injury to the air of towns which takes place under the present want of system, something might be done by storing up heat which has been generated. It seems somewhat astonishing that the Norwegian stove, which is simply a box lined with felt, has not been more generally adopted to assist in cooking operations. That apparatus, when properly made, will retain the heat at a very little below boiling point for many hours.

Another method of utilising stored-up heat has recently been suggested, and the London and North-Western Railway Company are applying it to their foot-warmers. This consists of using in the foot-warmer *acetate of soda* instead of water. Acetate of soda is a neutral salt in crystals, which melts somewhere about the boiling point of water. The foot-warmer, after being completely filled with the crystals of this salt, is sealed hermetically. The foot-warmer is then put in an oven, or in a bath of boiling water, until the crystals are melted, and the acetate of soda assumes a liquid form. The foot-warmer will then cool down gradually, in which operation the liquid crystallises. During this crystallisation it throws out the latent heat absorbed to convert the salt from a solid to a liquid form. It is said that these foot-warmers remain hot for eighteen hours, and that even then the crystallisation is incomplete, and that on tapping or shaking the foot-warmers the crystallisation of those parts of the substance which had remained uncrystallised commences, and the foot-warmers become hot a second time. It would be trespassing too much on your time to show how this might be utilised in warming or cooking.

It is clear that, by one or other of these methods of economising coal, and by storing heat, a great economy of fuel might be obtained, and the amount of coal consumed in domestic fires be so diminished as to keep the air of London in a far purer condition than it is now in, because the smoke from manufactories and steam-engines may be controlled under the existing laws.

The economy of fuel in generating heat must, however, be accompanied with constructional arrangements which will retain the heat in the building.

A railway carriage is very cold in winter, because its roof and sides are thin, and the heat is radiated out into space as soon as generated. A similar effect takes place with an iron hut, and the effect is proportionate with houses with thin walls.

The temperature which can be maintained in a house will greatly depend on the construction of the walls, and on the materials of which they are composed. Materials differ greatly in their power of allowing heat to pass through them. Thus, metals radiate the heat very fast; ordinary building stone radiates more rapidly than brickwork. A wall with a hollow air-space in the centre radiates less heat than a solid wall. Thus, the loss of heat through a solid wall, one brick or nine inches thick, would be one-half more than that through a wall consisting of two half bricks (four-and-a-half inches each) with a small air-space between them.

The loss of heat by windows is about two-and-a-half times that through a fourteen-inch brick wall. Windows with thin glass allow the heat of a room to be dissipated very rapidly. The draught felt near a window is generally owing to the air of the room cooling against the glass and falling down. The loss of heat with double windows is little over one-half that from a single window, and double windows have the advantage, not only of transmitting less heat, but, from the temperature of the inside glass being greater, less radiant heat is absorbed from the occupants of the room.

There are other ways in which heat could be economised. For instance, if the air introduced to ventilate a dwelling were passed in underground conduits, impervious to the ground air, it would in winter acquire the medium temperature of the locality—that is to say, a temperature higher than that of the out-door winter temperature—and thus economise the fuel which would otherwise have been required to warm it; and in summer it would be refreshingly cool.

After everything possible has been done to purify town air, it will still be much more impure than country air. When space in town is limited, and when a large population must be crowded on to a small area, it is necessary to adopt a form of town dwelling round and through which air can easily circulate.

I have already mentioned the fact of the healthiness of model lodging-houses in relation to the density of population provided for in them.

The model lodging-houses consist of several storeys of dwellings, one above the other, so arranged as to allow ample circulation of air round the buildings, and ample ventilation through the dwellings. If as large a population as is contained in blocks of model lodging-houses were located on an area of equal extent in one or two-storey buildings, the space between the dwellings would not allow of adequate circulation of air or of adequate ventilation. The air would be stagnant, and that great cause of purification of the air, viz., movement, would be absent.

Circulation of air round the dwellings can only be secured on a crowded area by placing the dwellings one above the other, leaving ample space all round.

Let any one visit, on some fine afternoon, one or other of the recently erected model lodging-houses. He will see there rosy children, with space to play in, and dwellings bright with sunshine, around and through which air can circulate. Let him, after that, pass through the crowded streets in the neighbourhood of St. Giles'. On a sunny day—if the term sunny can ever be applied to the murky light which penetrates through the smoke in that neighbourhood—he will have to thread his way through crowds of pale-faced children, enjoying their only playground, the street—their only toys, refuse and cabbage-stalks; on a wet day, he will see the same children crouching in doorways, which are the entrances to foul, gloomy dwellings, into which it is impossible that a ray of sunshine or pure air can ever penetrate. He will feel that it is as difficult for a pure mind to develop in such foul surroundings, as for any but a strong constitution to survive such insanitary conditions; and he will doubt whether such dwellings ought to be permitted in a country which prides itself on its civilisation and on its sanitary progress.

The removal of the soot and smoke from the air of London would do much to mitigate these evils. But more than that is required. Dwellings like those above mentioned must be re-constructed on sanitary principles. The purification of the air of London from smoke, and the creation of healthy dwellings for all classes, cannot be attained by legislation alone; legislation on such matters must be accompanied by the co-operation of the individual members of the community. When that co-operation has been secured by the spread of sanitary knowledge, we may hope for practical progress in the diminution of preventible disease, and for a general improvement in the health, and, therefore, in the happiness, as well as in the wealth-producing power of the community.

THE SANITARY INSPECTION OF HOUSES.*

By Sir William Jenner, Bart., M.D., K.C.B., D.C.L., F.R.S.

I wish to say a few words as to the origin of this museum. Dr. Parkes, whose name it bears, was one of the most amiable men that ever lived. I think he was the nearest to perfection that I have, in my long experience, been acquainted with. He was not only amiable, but he loved his race, and desired on all occasions to benefit others. He thought little of himself, and devoted the last years of his life to the study of hygiene, and how it could be applied for the public good, and died deeply regretted by all who knew him. When he was dead the profession thought how they could best honour his memory—what memorial we could erect to so excellent, so good, so honourable, so great a man—and we thought of busts and pictures, and various other modes of keeping alive, so long as those who knew him were here, his memory. We loved him too dearly to require to see his picture before us. We dismissed that, and then we thought of scholarships, thinking they would be of some service, but not much. There are a great many scholarships, and many of them of little service, and we did not see how they would accomplish what he, good man, would wish; and so it was determined to found a museum for the purpose of spreading abroad the knowledge of those principles of hygiene to which Dr. Parkes had devoted the energies of his latter days. And so we joined together to found the Parkes Museum. I was elected the Chairman of the Executive Committee, and hence I am here especially this afternoon. Well, that was its origin. Now, it was determined to get together a collection of appliances, etc., which required to be explained, and it was determined that some of our friends should give lectures and expositions to the working men especially. Others who pleased were to go, but the working men were invited with the view, not only to the improvement of their own homes, but the homes of you who live in great houses. Living in a great house did not keep a man safe from disease. I will give you a case in point: I had a gentleman to see who wished to leave London, and who has a great place of his own in the country. He is staying at an hotel, and must be moved into a house suitable to his rank and station. Well, his wife looked round London for a house, and at last she found a great mansion, described to me as one of the finest mansions in London, situated in one of the finest regions in London, from which a noble earl was about to move out, and who consented to move a little earlier to make way for my friend. He had only taken the house for a season, and that house belonged to a noble lady. The medical man of the gentleman about to become the tenant, said: 'Let us see what is the sanitary state of the premises, and let us have a report from a competent authority.' Many of you will not understand this allusion, for, if you want to have your houses healthy you must support this Institution in which the workmen employed will know how to make a house healthy. Many will not understand it, but those that do will see the importance of it. This report was only given a few days ago, and what did it say? Why, that in this 'one of the finest mansions in London' the baths of the residence descend into the soil-pipe unventilated; that is to say, that the sewer-gas found its way right into every bath-room in the house. Now, let us think what that is for a moment. The sewers of this metropolis are always filled with the poison of typhoid fever, with diphtheria, and a series of other terrible maladies, so that the persons living here were breathing these vapours, and it could only have been by accident that the inhabitants of the premises in question escaped infection. If they had inhaled them they would be suffering from some of these dreadful diseases. Medical men know only too well the fatal consequences of ignorance of the commonest form of sanitary precaution. To-day they found a mother weeping for her child, to-morrow a wife lamenting the loss of her husband, and all through not knowing the first principles of sanitary science as applied to the homes in which they lived. Well, what else is found in 'one of the finest mansions of London'. 'The basement sinks and all upstairs, save one housemaid's sink, go into the drain

* Speech delivered at the Mansion House on the occasion of the Anniversary Meeting of the Parkes Museum of Hygiene, July 27th, 1880.

direct; the closets are valve-closets in the best part of the house; but the closet rooms are unventilated, except the second floor and top water-closet. The main cistern on the roof supplies a closet, and the basement drinking cistern has its waste-pipe entering the drain.' From, this description, you will see that there is nothing to prevent the drinking water of 'one of the finest mansions in London' becoming charged with typhoid poison direct from the sewers, which must give typhoid fever. This shows you what some of the biggest houses are like. I could not point my finger round the room without pointing my finger at the occupier of some house quite as bad as this mansion.

It was not intended to found a charity. We do not come here to plead for a charity, unless it be —and I think there is great truth in the saying— that 'charity begins at home'; but it should not end there. It would commence there if you would support an Institution like this, so that a true knowledge of sanitary science is spread amongst the working classes; it would not end there if men who have been taught to save the lives of their own children will, by their skill in the construction of dwellings, enable others to do the same. Even if only one mother should save her child's life, do you not think it would be beginning charity at home. I have spoken of the terrible diseases which may arise from these foul drains through bad water; but that is a small part of what it may produce. The life of a man depends upon his blood. It is his blood that nourishes his brain and his body, and the quality of the future man depends to a very great extent upon the quality of the blood in the child. Now, it follows that a child who is constantly breathing foul air is deteriorating, for blood is the pabulum of life. Many a person who is suffering from out-of-healthiness is suffering from breathing perpetually foul air. Sore throats and a variety of complaints owe their origin to this cause. The doctors see it, and tell you you are living where there is foul air. A parent asks, 'Why are all my children looking pale and miserable? they have a healthy situation where they have baths, etc.'; but the explanation was simply this, the sanitary arrangements were not perfect. I will give you an instance that came under my own observation. Not long ago I went to Mortlake, where my children were at school, and I was told by the schoolmaster that a sewer was ventilated outside his door, and I gave the master a certificate that serious consequences might result, and I said amongst other things that perhaps you will have pneumonia. What happened? They would open this sewer, and the result was that a poor little page-boy, whose window abutted on to the work which was being done, was seized with pneumonia, and died. I ask you to educate these people. I paid a lot of money a little time ago that the drains of my house should be put into order, but after a month I found everything as bad as it could be, and I sent for another man, and paid a lot more money, but they were not put right, and I sent a third time, and I had been recommended a sort of clerk to the works—a man to speak to who seemed very well educated. I happened to come home in the middle of the work, and the foreman pointed out to me that he had fixed a D trap to a certain pipe, and I said I would not have a D trap. He said it would be model thing; when I turned upon him and said: 'A D trap; I call it a double D trap, for it will deal out disease and death.' D traps always require inspecting. The fact was that these so-called intelligent workmen were desirous of doing what was right, but were ignorant how to do it. I went round the house, and found that the man had trapped the ventilating pipe of the sewer, and the result would have been a burst of sewer-gas. I say, if any of you want your drains put right, or your water-supply, drains, or sewers put in order, how are you to get it done? I am asked the question constantly; the workmen have never been taught, and you should go to those who have made these matters their study. These workmen are as conscientious in their work as you and I, but they are ignorant of sanitary principles, and ignorance deals out disease and death. What we want—I am Chairman of the Executive Committee, and I am going to speak very plainly, as I usually do—is money to carry out our views, and to continue the work which we have begun. It is a good many years ago now, and I was then comparatively a young man. I was asked by a lady sometime ago to visit her husband, who was desirous of giving away a large sum of money, much larger than she thought he could afford, and use my influence in the matter, and she said 'Perhaps you will accidentally drop in after church, and just bring up the subject'; and so after church, where perhaps I had heard a good sermon, and felt inclined to do it, I went in and mentioned it to him, and this is the remark he made to me when I referred to the largeness of the sum. 'Yes, it may seem so to you who are a doctor, but it is nothing to City men.' Now, we come into the City, and we want you to do more than we poor doctors do. We come into the City, and we ask you to help the citizens, and citizens' wives to give money to this fund—it is not charity I am asking you for— and unless you do we cannot carry on this work, about which politics have nothing whatever to do. Whether we save the life of Whig, Radical or Tory it is all the same. We ask you to give your money, and give it liberally. We want a large sum to found this institution. We have done what we could, and us doctors are animated solely by the desire to prevent people being ill. We are like the lawyers who are animated by the desire to prevent people going to law, and we ask you to help this museum. As I said before, let some mother assist us in order that she may think of preventing people suffering from fever and foul air.

THE DUBLIN SANITARY COMMISSION.

THE Report of the Commissioners appointed to enquire into the sanitary condition of Dublin, with the evidence taken, has just been published. The blue book consists of nearly 300 pages of closely-printed matter. The evidence is exhaustive of the subject and conclusive, and the report is adequate and worthy of the reputation of the Commissioners. Mr. Robert Rawlinson, C.E., C.B., the Chairman of the Commission, is too well known as an eminent Sanitary Engineer to need commendation or eulogy in this place; the fact also that he represented the English Local Government Board at the enquiry, rendered his task comparatively a light one. Of the other commissioner, Dr. Francis Maccabe of the Irish Local Government Board, more must in justice be said. An able sanitarian, but surrounded by influences which would tend to stop a too exhaustive investigation, Dr. Maccabe has had anything but an easy or agreeable duty to perform. In spite of the impediments by which he was necessarily hampered, he has brought in a verdict of guilty on the facts, and we believe every honest Irishman will agree

with the sentence. Nothing has been kept back in the report, and the conclusions are as honest and practical as they are creditable to the perspicacity and ability of the Commissioners. No one could have done better service than Dr. Maccabe, and his labours deserve special recognition at the hands of those in authority. Owing to the lamentably sudden death of Mr. Dixon, the duties of secretary suddenly devolved upon Mr. Robert O'Brien Furlong, barrister-at-law, who has rendered good service to the cause of Public Health in Dublin, in connection with the Dublin Sanitary Association. Mr. Furlong brought to the task a capable and trained mind, and the report bears on the face of it many proofs of his ability, and of his practical acquaintance with health matters.

It will be in the remembrance of our readers that, in 1876, a Special Commissioner, Mr. Henry C. Burdett, was sent by the Editor of this journal to examine and report upon the sanitary condition of Dublin, and to recommend such reforms as he might consider necessary. Mr. Burdett has had exceptional opportunities of ascertaining the origin and causes of outbreaks of epidemic disease. His reports upon the War Office and New Foreign Office, and other Government buildings, which were published in this journal a few years ago were so convincing that a Royal Commission was issued in the first case, and a Select Committee of the House of Commons in the second.

Our Commissioner has visited and made minute investigation into the conditions under which the poor population live in the large towns of England, Ireland, and Scotland (many of his reports have appeared in the SANITARY RECORD), and it is probable that Mr. Burdett has a wider knowledge of the sanitary condition of the United Kingdom, and a more varied experience of the causes of epidemic disease, than even the officials of the Local Government Board itself. It follows, therefore, that his reports were able and exhaustive, and it does not surprise us to find that the conclusions of the Royal Commissioners are almost identical with those arrived at by Mr. Burdett four years ago, notwithstanding the fact that there has been some improvement in the health arrangements of Dublin since the date of his reports.

Mr. Burdett was specially summoned ot give evidence before the Commission in Dublin, and before taking his evidence the Commissioners informed him that his very able reports (published in the SANITARY RECORD of 1876) were in the hands of the chairman and Dr. Maccabe; that they presumed his verbal evidence would be something to the same effect, and if so, unless there were some new features, the Commissioners would accept his reports, and thus save him the trouble of going over the whole ground again. This was a great compliment to our Commissioner and our Journal, and it may be regarded as trustworthy evidence that it is probably due in no small degree to Mr. Burdett's reports that the late Commission was appointed. The Irish *Builder* has long laboured in the same field; and to its exertions and to those of the Dublin Sanitary Association, supported and amplified by the irrefutable reports of the SANITARY RECORD, the present improvement and the future adequate advancement of health arrangements in Dublin may fairly be credited.

We have said that the Royal Commissioners practically accepted the reports of the SANITARY RECORD as evidence, and that the conclusions arrived at were mainly those of our own Special Commissioner. We will justify this assertion a little in detail. With this object we will print the conclusions of the Royal Commissioners and those of our Special Commissioner in parallel columns.

Conclusions of Royal Commissioners (1880),	*Reports of Special Commissioner of* SANITARY RECORD (1876),
On Sanitary Condition of Dublin compared.	
I.	
That new sewers are required, but the entire system of sewers and drains should be more fully ventilated.	As we have shown more than once, the sewage arrangements of Dublin are lamentably deficient and incomplete, and, what is worse, the major portion of the sewers open into the River Liffey—that savoury stream, the Irish Styx. In this way an open sewer is formed, running through the heart of the City of Dublin, and at high tide each day the water rushes into the sewers, which, in the greater number of instances, open into the river below high water-mark, thus forcing the sewer-gas into the houses, which are connected with the present drainage system. This evil is greatly aggravated and increased by the non-ventilation of the sewers. A properly ventilated sewer being unknown in Dublin. SANITARY RECORD, Dec. 23rd, 1876, p. 401.
That the River Liffey is polluted by the sewers of Dublin so as to be offensive.	
That, though appearing not directly injurious to the health of the inhabitants, it is, in our opinion, prejudicial to the interests of the city and port of Dublin.	
That, on the evidence placed before us, we cannot but hold the Liffey accountable for the high rate of mortality which has prevailed, and continues to prevail, within the district which it traverses.	
. . . .	. . . .
We are also of opinion that the River Liffey and the port and harbour of Dublin ought to be free from the pollution.	A walk by the side of the Liffey at low tide will convince the most callous, that it is little better than an open sewer, and that it constitutes such an abominable nuisance, that in no other city but Dublin would it be tolerated for a month, much less praised as a sanitary adjunct to the health of the citizens.
II.	
That house-drains are proved to be very defective, and that the yards, courts, and back streets are for the most part defectively drained, and very dirty in consequence.	The condition of the streets and the scavenging arrangements reflect the greatest discredit, not only on the Authorities, whose duty it is to attend to these matters, but also upon the ratepayers, who allow such shameful neglect to continue, to the disgrace of all concerned.—SANITARY RECORD, p. 402, Dec. 23rd, 1876.
	Conclusion *d.*:—The condition of the privies, ashpits, yards, and all the surroundings is very bad. Question 2078, Mr. Burdett's evidence; also Question 2084. Report x of Special Commissioner.—SANITARY RECORD, Dec. 16th, 1876, p. 385. We have given abundant proof in previous reports that as a rule the ashpits and privies of the tenement

III.

That the privy accommodation is generally defective throughout the poorer quarters of the city, and that it is in the tenement houses practically absent, and that as a consequence the inhabitants suffer both in health and in morals. The tenement houses of Dublin, according to the medical evidence voluminously tendered at our inquiry and embodied in this our report, appear to be a primary source, and the cause of the excessively high death-rate.

That they are not properly scavenged, ventilated, and regulated.

That they are dilapidated, dirty, ill-ventilated, and much over-crowded, and that disease and craving for drink, and consequent drunkenness and extreme poverty, are thereby fostered; and until the condition of these houses has been improved, the general health of the city will continue to be injuriously affected.

houses are in a most disgraceful condition, etc.

Reports iii, iv, v, and vi of Special Commissioner.—SANITARY RECORD, Oct. 28th, Nov. 4th, 11th, and 18th, 1876. Question 2082. The conditions under which the majority of the poorer inhabitants live is highly dangerous to the public morals and the public health.

Conclusion *g* of Special Commissioner — SANITARY RECORD, p. 402, Dec. 23rd, 1876; also Mr. Burdett's evidence and letter in FREEMAN'S JOURNAL, 9th Oct. 1879. I do not think it necessary to give harassing details of the condition of the tenement houses in all parts of Dublin. I may, however, say here that my notes reveal so lamentable a condition of affairs everywhere in this respect that no unprejudiced observer can fail to be convinced that the conditions under which the majority of the inhabitants of Dublin constantly live are enough, and more than enough, to account for the high death-rate.

IV.

That most of the courts and yards in connection with the tenement houses are unformed and unpaved, and that as a consequence there is an accumulation of offensive dirt, general discomfort, loss of health, and loss of power to earn wages.

Reports iv, v, and vi of our Special Commissioner prove this beyond dispute. In his evidence, Question 2084, he says: I have seen the backyards under favourable conditions, because there has been fine weather since I have been here, and I went round after the scavenging had been done. The yards are not flagged, they have not proper drains; there are open gulleys. Whenever there has been any deposit, however moist, it accumulates, and you get a stagnant mass of filth, which is due to the fact, that the yards are not properly laid. Some of the yards are indescribably bad.

V.

That many of the streets are formed of defective materials.

That public scavenging is inadequately performed. There is no municipal system of private scavenging, and as a consequence the streets are dirty, the courts and yards are at all times filthy, and, in our opinion, the cleanest and cheapest mode of removing excreta will be by water, through water-closets, drains, and sewers to a common outlet. Houses must be drained; streets must be sewered so as to remove waste water; and, if these drains and sewers are well and truly constructed, to transmit the entire volume of excreta of the houses and city.

Report vii of our Special Commissioner, pp. 337 and 338, Nov. 25th, 1876. It will be noticed that over and over again we have commented upon the abominable state of the streets, and that in many instances we have drawn attention to special localities by name. Paving ought to be adopted in lieu of Macadam, on the grounds of health and economy, etc. Question 2063 to 2068 of Mr. Burdett's evidence.

VI.

That both public and private manure depôts are at present in improper places in the city.

That some of them are situated in courts and yards surrounded by dwelling houses, and consequently injurious to the public health.

It is not too much to say that these yards constitute a nuisance dangerous to health. Indeed both Medical Officers of Health have expressed the strongest objection to the existence of the corporation depôts in the centre of a considerable portion of the population of Dublin. The private manure yards are certainly abominable nuisances, etc. Special Report, No. 10, pp. 386, 387.—SANITARY RECORD, Dec. 16th, 1876. Evidence of Mr. B.; Questions 2112, etc.

VII.

That slaughter-houses, cow-sheds, and dairies are in improper places within the municipal area, and that some of them possess no adequate appliances for drainage, cleanliness, and ventilation.

The milk supply is alarmingly dangerous to the public health, owing to the insanitary condition of the dairy yards and cowsheds. Conclusion E of Special Commissioner, p. 402.—SANITARY RECORD, Dec. 23rd, 1876.

In one yard we found a number of cows crowded together in such a limited area that it was impossible for all the unfortunate animals to lie down at the same time. Their general condition was abominably dirty, and foul, etc. Report 9, p. 369.—SANITARY RECORD, Dec. 9th, 1876.

I find the condition of affairs in the neighbourhood of the Four Courts Meat Market, where the Castle butcher will be found, in so filthy and dilapidated a state that nothing short of demolition of an entire block of houses will meet the case. Letter to *Freeman's Journal*, Oct. 9th, 1879.

VIII.

That, considering the extensive sanitary improvements necessary in Dublin, we are of opinion that the superintending medical officer of health of the city should devote his whole time to the duties of his office.

The failure of the present system demands, in the interests of the citizens, that a medical officer of health, with sufficient power and an adequate salary, shall be appointed to control the present staff, and to take up a position of control and superintendance over all the sanitary officials of the corporation, on the plan adopted at London, and at Liverpool, Manchester, Glasgow, Birmingham, and elsewhere, as provided for in clause 10 of the Public Health (Ireland) Act, under the title of Medical Superintendent Officer of Health. Conclusion I of

Special Commissioner, p. 402.—SANITARY RECORD, Dec. 23rd, 1876. Also evidence of Mr. B.; Questions 2149—2156.

I want particularly to urge that Dublin should have a Medical Officer of Health whose whole time shall be entirely devoted to his duties. In making this suggestion, I do it as a matter of conviction, believing it to be a matter of absolute necessity, etc.

The remaining conclusions of the Royal Commissioners relate to the absence of adequate provision of baths and washhouses, the purity of the Vartry water-supply, the prevention of nuisances arising from smoke contamination, and other matters. They deal with the respective merits of the water carriage and the pail systems for disposing of excreta, and the failure of chemical treatment and of sewage farms. The report concludes with an examination of the plans for the new main drainage works.

A perusal of the evidence and report proves once more the truth of our former assertion that Dublin, the metropolis of Ireland, situated close to the open sea, within a few miles of a range of mountains, with wide air-spaces within the city itself, surrounded by beautiful environs and by charming suburbs, with a mild equable climate, abundant supplies of pure water, and an atmosphere comparatively free from smoke—*should* be a healthy city. That it is not so is shown by the stern facts published by the Registrar-General year by year, but no less certainly by the crowded hospitals, by the pallid, careworn faces of its poorer inhabitants, and by their want, misery, drunkenness, and degradation. These pages have borne witness to the horrors that exist in the 'fever-nests' of Dublin. Harrowing are the details recorded by our Special Commissioner, so harrowing as to be almost incredible. But, apart from the unimpeachable truthfulness of their chronicle those details are substantiated in every particular by the foremost sanitarians in Dublin itself, by the published reports of the Sanitary Association of that city, by the newspaper press of Dublin, almost without exception, and, we may now add, by the report of the Royal Commissioners. Sanitary reform has too long been postponed in the Irish metropolis. It is quite time that something was done; there has been enough, and more than enough, of writing and talking on the subject, and we earnestly hope that the publication of the report of the Royal Commissioners will be followed by a determined and adequate series of measures which will not be discontinued until Dublin takes its place as the healthiest, instead of the least healthy, city in the British Empire. It remains to be seen if this hope will be realized. Judged by their past acts, the Dublin Corporation are not a body to inspire public confidence, or to awaken to a sense of their position. They will have to change many of their obstructive officials, and to appoint competent, honest, and specially trained sanitarians in their place, before any adequate reforms can be carried out; and the sooner they arrive at this conclusion, and act upon it, the better for their own credit and the health of the citizens of Dublin.

Dr. Joseph McClelland has been appointed Medical Officer of Health for Toxteth Park Local Board, vice Dr. Pendleton.

ON THE EXCESSIVE INFANTILE MORTALITY OF WORCESTER: ITS CAUSES AND REMEDY.*

By W. STRANGE, M.D.,

Senior Physician to the Worcester Infirmary, and Medical Officer of Health for the City.

THE great importance of accurate statistics relative to infantile mortality need not be insisted upon. The lamentable loss of infant life which, more especially of late years, has developed itself in our urban populations has at length begun to rouse the attention of that small portion of the public which takes an interest in the progress of real sanitation, and it behoves us, as Health Officers and leaders of public opinion on health matters, to guide that attention into profitable channels.

You are quite aware how misleading are the mere reports of the death-rate amongst both adults and infants which are published by the registration officers, general and local. Anyone who attempts to draw conclusions from these, without taking into consideration the character of different towns as to the population, its employment, its age, its wealth or poverty, and indeed, all other social characteristics, as well as its climate, soil, drainage, etc., will undoubtedly fall into grievous, not to say ludicrous errors. With regard to the infantile death-rate, what would be the use of comparing Worcester with Cheltenham, or Brighton and Scarborough with Leicester and Bradford? The one class of towns has a preponderance of adult and healthy lives, with few children, the other, a vast preponderance of young and infant lives, and these of the poorest of the population. Even in the same towns, the rate of deaths amongst children varies as much as it does in towns of different or wholly opposite character. The poorer the population the greater the proportion of young children and the higher the infantile death-rate, because the children are more crowded, worse fed, and more ignorantly managed than those of their richer neighbours.

Again, the employment of the mothers has a marked influence upon the fate of their infants. In those towns where the married women habitually work in factories, leaving their infants to the charge of scarcely larger children for the greater part of the day, there the infant mortality rules high. Where the women do at home what would be factory work if done out of doors, such as glove-making, lace-making, and such like work, the children also do badly, because they are kept in the stuffy rooms where the women work, instead of, as in the case of the country poor, tumbling about all day out of doors.

Lastly, but without by any means exhausting the list of occasional causes of variation in the rate of infantile mortality, I may mention the effects of climate in different seasons and years, an effect but little estimated as yet with any degree of accuracy, and which can by *no means* be gauged by looking to the registers given by the barometer, the thermometer, or the rain or wind gauge. The variation of the infantile death-rate, and, indeed, that of adults also, from year to year, is a fact as yet inexplicable by any known telluric phenomena, although it is very probable that some changes in the earth's condition—its magnetism, its air currents, or some other relations to its primary—the sun—are answerable for a con-

* Read at the Meeting of the Birmingham and Midland Counties Association of Medical Officers of Health, held at Worcester, July 1st, 1880.

siderable, yet unascertained effect upon the health and mortality of the civilised portion of the human race.

But I will now pass on to the examination of the rate and the causes of the infantile mortality of the city of Worcester, and to the consideration of any means whereby they may be diminished. There is nothing that I know of in the situation, soil, or climate of this city which should give it its high infantile mortality. Nor are there any sanitary defects of an external character, and such as are remediable by the sanitary authority, which require a remedy. The supply of water is abundant and excellent. Severn water, well filtered, the analysis of an average specimen of which I give you, is laid on to every house in constant supply. The city is sewered all over, and every house has its drains in communication with the sewers, which are regularly flushed and ventilated. No refuse is allowed to be in any street, court, or alley more than two or three days. The open privies, of which in 1874 there were 1847, have to a great extent been converted into water or sanitary closets, and the cesspools have been abolished. The Urban Authority has supplied me with a hospital of 24 beds for infectious cases, to which a disinfecting apparatus is attached, and also with a mortuary and *post-mortem* room.

For years past, the city grave-yards, except one in the suburbs, have been closed, all interments taking place at the cemetery, situate between one and two miles from the centre of the city.

Although, to my great regret, the Artizans' Dwellings Act has not been put in action in Worcester, a great many street-improvements have lately been made, all of them having the effect of letting in air to the more densely populated parts. Numbers of old dilapidated premises have been repaired, and a good deal of attention is bestowed by the Inspector and by myself to the cleansing and whitewashing the smaller class of dwellings.

Having been struck by the high rate of infantile mortality which the registers for several years have exhibited, I set myself, in the years 1878 and 1879, to examine them, more particularly with a view to ascertain its cause. For this purpose every death occurring under five years of age was analysed—1st. As to the locality. (In a great many instances I visited the house in which the death occurred.) 2nd. As to the sanitary condition of the dwelling and its surroundings. 3rd. As to the occupation or rank of the parents. 4th. As to climate and season.

Then as regards the infants themselves—5th. Their age at death. 6th. The disease of which they died.

By these means, and these means alone, I hoped to be able to satisfy myself as to the real causes of the high rate of death amongst our infantile population, and especially as to the truth or untruth of the favourite dictum 'that the rate of infantile deaths to births is a true test of the sanitary condition of any locality or district'. Whether this much vaunted dictum be true or untrue as regards the city of Worcester will be soon apparent to you.

The first table shows the number of deaths in each registration sub-district of the city in the year 1878. The number of deaths of children under five years of age was 354, out of a total of all deaths of 845; of these, 181 were male children, and 173 female, or, as nearly as possible, in the same ratio as the births of the two sexes. In the sub-district of Claines the annual death-rate of children was 11.5, in the northern district 7.7, in the southern 10.8, in the western 10.4. Thus, with one exception, there was very little difference in the different parts of the town; Claines, where the deaths were highest, being the most open and airy. The exception is, that the workhouse, being situate in the northern district, reduces the infantile mortality relatively in consequence of many old people dying in it. The ratio of deaths to every 1000 births in each ward is as follows:—194, 177, 188, and 213, averaging 189 for the whole city.

TABLE I.—*Showing Number of Deaths, at ages from one month to five years, of Children in the four Sub-Districts of Worcester in the year* 1878.

Sub-District.	Under 1 mo.	Under 3 mos.	Under 6 mos.	Under 1 yr.	Under 2 yrs.	Under 5 yrs.	Total.	Males.	Females.	Death Rate per 1000 per annum.	No. of Deaths under 1 year in every 1000 Births.
Claines ...	6	8	6	10	5	5	40	23	17	11.5	194
Northern..	18	12	10	13	16	10	79	40	39	7.7*	177
Southern..	24	25	19	12	30	27	137	70	67	10.8	188
Western...	18	16	11	24	21	8	98	48	50	10.4	213
Total....	66	61	46	59	72	50	354	181	173	Collective rate 10.25 on 34826 Population in 1878.	Average 189

Total Number dying under 3 months = 127 = 1/3 of whole deaths.
" " 6 months = 173 = 1/2 nearly.
" " 1 year = 232 = 2/3 of whole deaths.
" " 5 years = 354

The Total Number of Births 1878 being 1223, there were 189 Deaths under 1 year for every thousand born.

In examining the deaths of children more closely, I was struck by the following circumstance, which has not anywhere, so far as I know, been sufficiently commented upon, viz., that not only was the number of deaths under *one* year great in proportion to the whole, but those under *six months*, and even under *three months*, were equally alarming. Thus, in 1878, there died under one year of age 232, or about two-thirds of the whole of the deaths under five years. But of these 232, not less than 173 were under six months old, and 127 of them even under three months, old. As the number of births in that year was 1223, it follows that one out of every *ten* infants born died before reaching the age of three months, one in every seven before reaching six months, and one in every five before arriving at the end of the first year of existence. Will the condition of exterior sanitation —the water supply, the drainage, the scavenging, all well supplied in this instance—really account to us for the deaths of these infants, most of them still at their mothers' breasts? I think not.

1st. As regards the localities, the deaths were scattered pretty evenly throughout each of the sub-districts, each of them having its fair complement of the poorer class of citizens. But there was a great difference in the *streets* where the deaths occurred, a difference which will be shown when I speak of the condition in life of the parents.

2nd. As regards the exterior sanitary condition of the dwellings and their surroundings. These are just as good in one part of the city as in another. Every house, great and small, enjoys the conditions for health which I have already enumerated. With regard to the interior of the dwellings of the poor, it must be allowed that, in numerous instances, these were not as they ought to be. Small bedrooms, often too crowded with children; windows seldom or never opened, walls dirty and out of repair, dirty bedding and furniture; all these are too often found. And yet numerous deaths occurred in houses which I found to be models of neatness and cleanliness, where in

* This District contains the Workhouse, in which few children but many old people die.

fact, there was nothing on the outside or in the inside to complain of.

We come, in the *third* place, to examine the condition in life and occupation of the parents of these infants. Here is a table showing this, in which I distribute population under seven heads.

TABLE II.—*Deaths of Children under five years of age, classed according to the rank in life and occupation of their parents.*

	Claines.	Northern.	Southern.	Western.	Total.
1. Gentry, Professional Men and Superior Tradesmen	—	6	8	5	19, or 1-18th of whole
2. Clerks, etc.	3	6	7	4	20, or 1-18th of whole
3. Artizans	16	18	71	34	139, or 2-5ths of whole
4. Domestic Servants	1	14	8	12	35, or 1-10th of whole
5. Porters, Waggoners, etc.	2	—	6	—	8, or 1-42nd of whole
6. Labourers	5	14	19	26	64, or 1-5th of whole
7. All others not classed	12	21	18	18	69, or 1-5th of whole

This table brings into strong relief *three* facts, namely: 1st. That out of a total of 354 deaths only 19, *or an insignificant fraction of the whole, have been of children whose parents were above the rank of artizans.* 2nd. That 139, or two-fifths of all the deaths, occurred in the families of artizans, in classifying whom I have been careful not to place any but those whose trade or employment should place them far above poverty. 3rd. That a large number of the children of domestic servants die; in all 35, or about one-tenth of the whole number of deaths. A large proportion of these children are illegitimate, and are generally put out to nurse.

In my report for 1879, I slightly varied the form of this table. The result, however, is substantially the same. It still shows a preponderating death-rate amongst the children of artizans, as compared to other classes, but the deaths amongst the children of gentry and professional men are somewhat more numerous.

I may note here, *fourthly*, the effect of climate and season upon infant mortality. In 1878, diseases of the respiratory organs, excluding whooping-cough as a zymotic, were fatal in 78 cases, or rather over one-fifth of the whole. In 1879, they were 51 out of 235, again about one-fifth. In the latter year, which presented us with a rare confusion and *bouleversement* of the regular order of the seasons, we have the following results:—Total deaths under 5 years, 235. Deaths in the first six months, 139; in the second, 96.

Here is to be noted that the very severe weather of the first half of the year destroyed 43 more children than died in the milder weather of the second.

The peculiarity of the seasons of the last year, however, render the above figures somewhat misleading. The first and last quarters were exceptionably severe, whilst the two middle quarters were mild; thus—

In the 1st and 4th quarters (severe weather), deaths, 125;
In the 2nd and 3rd „ (milder weather, but not hot), deaths, 110;

the difference of 15 is very trifling. It would have been greater but for the severe weather of the second, or spring quarter, which was even more fatal than the winter quarter, viz., 70 to 69. Nevertheless, these figures forbid us to attribute any great proportion of the excessive mortality amongst infants and young children to the effects of season or weather.

And now, in the last place, let us note the diseases of which the children die.

TABLE III.—*Showing the Diseases as registered, of which the Children under five years died, classified into Divisions which have a natural connection.*

1. Premature Birth, Non-Viability, Imperfect Development	24	
2. Inanition, Defective Nutrition, Decline from Birth	30	183, or more than half of the whole number of deaths.
3. Marasmus, Atrophy, etc.	41	
4. Convulsions, Water on Brain, Teething, etc.	28	
5. Mesenteric Disease, Tubercular Meningitis, etc.	28	
6. Diarrhœa, Dysentery, Aphtha, Stomatitis, etc.	56	
7. Diseases of the Respiratory Organs ..	75	
8. Zymotic and Contagious Diseases ..	47	
9. Causes not enumerated in the above, and Accidents	28	
	357	

Here is another table for the year 1879, in which the deaths of children of each class in life are distributed to their causes.

TABLE IV.—*Showing the Causes of Death of all Children under five years of age, classed according to the rank and occupation of their parents.*

Occupation of Parents.	1. Premature Birth and Imperfect Development.	2. Inanition, Defective Nutrition, etc.	3. Marasmus, Atrophy, etc.	4. Convulsions, Teething, etc.	5. Mesenteric Disease & Tuberc. Meningitis.	6. Diarrhœa, Dysentery, Aphtha, etc.	7. Dis. of Respiratory Organs.	8. Zymotic Diseases	9. All other Causes and Accidents.	10. Total.
Gentry, Professional Men, and Tradesmen....	3	1	1	5	2	1	12	3	2	30
Clerks and Shop-Assistants	3	—	2	1	2	2	4	2	3	19
Artizans and Workwomen ..	12	6	18	11	10	13	22	6	15	113
Domestic Servants	3	2	1	1	2	5	2	—	1	17
Labourers, Carters, etc.	—	4	7	4	9	7	12	2	8	53
All others not classed.....	—	—	—	—	—	—	—	3	—	3
Totals.....	21	13	29	22	25	28	53	16	31	235

With regard to the above table, it scarcely requires a professional eye to perceive that the diseases bracketed together have a close resemblance to each other, and in most cases are produced by similar causes. Moreover, as the number of each class progresses, we find that the number of deaths progresses also from the earlier ages to the later ones. Thus, premature births are all found to be fatal within the *first* month. Inanition, which is another name for a failure of natural nutrition, or decline from birth, or starvation, takes place also in the earlier months, 27 out of a total of 30 dying before they attained the age of six months. The same may be said of the *3rd* class—marasmus and atrophy,—which are scarcely distinguishable from the diseases of the class just named. The *fourth* class includes deaths from various remote causes, but which are generally set down in the registers as convulsions, teething, and hydrocephalus or water on the brain, both acute and chronic. Here the age at death slightly progresses, about an equal number dying under six months and under five years. The *fifth* class is but the sequel to the 2nd and 3rd. When the child has struggled on, in spite of defective nutrition or tendency to decline,

diseases of a tubercular character allied to consumption are apt to carry it off, such as mesenteric disease, and tubercular meningitis. In this class the majority live on to between one year and five years of age. These are the saddest cases of all, lingering on in a miserable existence of unbroken pain and suffering.

In the *sixth* class, indicating diarrhœa, aphthous condition of the mouth, and other similar affections of the mucous membrane of the digestive organs, the children die at all ages, the more debilitated dying first. In almost every case the same class of causes are effective in determining these disorders as those of the 2nd, 3rd and 5th classes, namely, improper food, management, and clothing, and exposure to impure air.

In the *seventh* class I have placed together all disorders affecting the lungs and other organs of respiration. Here it will be seen that the deaths progress as the ages of the children progress, a fact which points at once to the evils of insufficient clothing and reckless exposure to cold. In fact, five-sevenths of all deaths in this class take place *after* one year of age, when children are able to run about out of doors. Babies in arms are, as a rule, protected from the action of severe cold.

In the *eighth* class I have placed all so-called *zymotic* diseases, most of which are contagious or infectious, and never arise without contact with a previously affected person, except through the agency of a third person or thing, as a carrier of the infection. The seven chief zymotic diseases are:—Small-pox, scarlet fever, measles, whooping-cough, diphtheria, typhoid fever, and erysipelas. I omit diarrhœa. Several of these have been prevalent during the past year, and there were 47 deaths from them of children under five years of age. Thirty-five, or three-fourths of them, were from two to five years old; or at ages at which children carry about infection by congregating together at school or play.

To the *ninth* and last class I have relegated the deaths from all other diseases, such as those from which grown-up people suffer. They amount to only 28 of the whole number of 354, and may, therefore, be disregarded in the present report and its argument.

The diseases of the five classes, all so closely connected that I have bracketed them together, killed in each of the years 1878 and 1879 just over one-half of the whole number; thus—

Class of Disease.	1879.	1878.
No. 2. Inanition, Defective Nutrition, etc.	13	30
No. 3. Marasmus, Atrophy, Wasting, Decline, etc. ..	29	41
No. 4. Convulsions, and deaths whilst Teething ..	22	28
No. 5. Mesenteric Disease, Tubercular Meningitis, etc.	25	28
No. 6. Diarrhœa, Aphtha, Stomatitis, etc.	28	56
	117	183
Total Deaths	235	357

That the deaths from these diseases, engendered by errors of nutrition, acknowledge no fleeting or accidental cause appears from the fact that, to the total number of deaths, those of each kind hold almost exactly the same proportion in each of the two years. Further, the proportion they bear to the different classes of society in each year is also singularly exact.

I may rehearse the several conclusions deducible from the above tables. 1st. That difference of situation in the town causes but a trifling disparity in the proportion of infantile deaths. 2nd. That soil, water, and cleansing, appear to have a varying but trifling effect on the proportion of said deaths. 3rd. That season, cold and heat, have but the most trifling effect, setting aside summer diarrhœa in hot seasons. 4th. That epidemic diseases prevail irrespective of season or sanitary conditions, the deaths in 1878 having been *three times* as many as in 1879, *all sanitary conditions having been the same.*

In my special report to the Urban Authority I gave a table showing the number of infantile deaths in each street of the city. With this I need not trouble you. But in order to prevent an erroneous judgment, several points in that table require attention. The size of the street will be a rough guide to the number of its inhabitants, and its name will convey to local readers some idea of the class of persons by which it is inhabited. Again, in estimating the density of the population of any locality, regard must be had to the number of courts lying behind some of the main streets. Thirdly, the closeness with which the streets in some parts of the city are built, will increase the density of the population. But making all these allowances, the relative numbers attached in the table to each street have a certain value. They show, at all events, that where the figures are high, there, with some slight modifications, the death-rate of infants is relatively high also. Dolday, Tybridge Street, with its numerous courts, King Street, St. Peter's, Hylton Road, Severn Street—the old Frog Lane, and some streets in the Blockhouse, enjoy an unenviable pre-eminence as regards infant mortality. Then we come down to several streets, both in the *older* and *newer* parts of the city, where so many as six deaths took place, and so on to smaller numbers. As regards the supply of water and main drainage, all parts are much upon a level, and no one has been able to impugn the goodness of the Severn water as now delivered, or, allowing for some faults, the general efficacy of the drainage. With regard to the condition in which the dwelling-houses appeared on inspection, it was found to be very indifferent in many instances; yet in others, where equal mortality existed, it was found to be good. The same observations apply to the sanitary surroundings of the dwellings. No doubt, in many streets, and especially in the courts at their back, the air is close and confined, but where that is the case the greater care has been taken with regard to scavenging, and in all the closer parts water-closets have been substituted for the open privies which prevailed to such an extent a few years ago. Of course, the poorer the dwellings and the more sordid the surroundings, the poorer and more abject and ignorant may we expect to find the inhabitants.

Causes of Infantile Mortality.—With facts like these before us, pointing in such different directions, and which have been collected with all the care I was able to bestow upon them, let us now see if any clear and definite ideas can be formed as to the *real causes* of the deaths of so many infants in this city.

In this enquiry I think it will be well to proceed by way of exclusion, and note, first of all, those circumstances which *cannot* have contributed, except in a very slight degree, to the results shown by the tables.

The *external* circumstances are water supply, drainage, and the unhealthiness of dwelling-houses, or their surroundings.

The twenty-four deaths resulting from premature birth or defective development at birth, are out of our control and may be set entirely aside. We come, next, to no less than 183 deaths of children from diseases named in the next five classes, such as inanition, decline from birth, marasmus and atrophy, convulsions, mesenteric disease, and other affections

of the digestive organs, and, finally, to diarrhœa and dysentery, *all diseases of disordered nutrition.*

Now, 102 of these, or more than half, died before they reached six months old. As a rule, infants of this age are not consumers of water, unless boiled with their food; nor are they carried off by zymotic diseases, such as typhoid, diphtheria, or other fevers, the result of bad drainage. In the summer and autumn months some die from diarrhœa, which is almost everywhere more or less prevalent at those seasons. But even these are not numerous, and the mortality from summer diarrhœa has greatly declined of late years, whilst the deaths from typhoid fever and diphtheria have been reduced to a minimum. Again, children under six months old are not much exposed to cold, and, consequently, only nineteen of this age are set down as dying from any disease of the lungs, or other organs of respiration. If, then, we cannot accuse the water or the drainage, or cold, of having had much to do with these results, what else is there in the realm of sanitary measures? Possibly the condition of the dwelling-houses and of their surroundings.

On reference to the table to which I have referred, we find that many dwellings are set down as *good*, fairly good, and fair; whilst others are classed as indifferent. A certain number, doubtless, are old and tumble-down places. Some of them, which I have called *dilapidated*, must be taken as still fit, when kept clean, for human habitation, because they are water-tight, and have no nuisances around them; others, again, are scarcely fit to remain as the abodes of human beings, and ought to be swept away. In the *seven* first-named streets, 68 deaths under five took place. Every one of these streets have a good supply of water and drainage, but in each case the houses are old and small, or crowded in dark courts behind the main streets. No dirt or accumulation of rubbish is long allowed to remain in these localities, and they receive the largest share of the inspector's attention. Most of the privies, formerly so numerous in the courts, have been removed, and water-closets substituted for them, so that the sanitary surroundings of these old dwellings are not so much to be blamed as the houses themselves. In the next ten or eleven named streets there are several which are in no way amenable to the charge of containing old dilapidated dwellings, or close, confined, air. Indeed, some of them are *new*, and to the eye look everything that can be desired. I may name Lansdown Street and Sandy's Road at Barbourne, and Chestnut Street, as new localities; and the London Road and Upper Henwick Road, as open and airy situations. Yet in none of these do we find less than five deaths of infants. Thus, a bad condition of the dwellings, which in some parts must have a certain effect in determining the ill-health which leads to this infantile mortality, is *totally absent in others* where an almost equal number of deaths took place. The sanitary surroundings, so bad in the first six or seven named streets, are set down as *good* in many of the succeeding ten or eleven, and this, be it remembered, from knowledge derived from personal inspection.

We come, lastly, to the so-called zymotic diseases, which sometimes cause much havoc amongst young children. Although scarlet fever, measles, and whooping-cough, were prevalent during the year 1878, there were only forty-seven deaths from all these causes, ten only of which were of infants under one year. These deaths were not confined to any one locality, but prevailed pretty evenly over each of the sub-districts. As they arise mostly from infection, we may safely set down as the great cause of their dissemination the reckless way in which children are allowed to congregate in groups whilst infection is amongst them.

The outcome of this enquiry, then, amounts to this: That whilst situation as to damp, crowded, or dilapidated streets or houses has a certain yet undefined effect in causing the deaths of infants; whilst exposure to cold and insufficient clothing account for a few more; whilst contagious diseases, which have prevailed epidemically of late, carry off some others; the great bulk of the deaths are inexplicable from any of these causes, or all of them combined.

Now, what becomes of the dictum with regard to infantile mortality to which I alluded in the beginning of this paper? If all the sanitary surroundings are nearly the same throughout the city, if all have free access to good water, drainage, and scavenging, how can we blame the external sanitary conditions? Granting that in the poorer houses, and in the most crowded parts of the city, the greatest relative number of deaths took place, we have seen that they were scarcely less numerous in the airy situations or in houses with which no fault could be found! Again, if few children of the wealthier classes died, still the deaths amongst the very poor, living in the *worst* localities, were exceeded proportionately by those of artizans earning good wages, and living, many of them, in model cottages. I think, then, that I am justified in asserting that, as regards Worcester, and, I conclude, other towns of a similar character, the dictum, *that the proportion of the deaths of infants under one year of age to every* 1,000 *births* is a true test of the sanitary condition of any town or neighbourhood, *is not true.**

The only remaining circumstances which we can conceive of as materially conducing to this lamentable waste of infant life, are those arising out of the *Ignorance*, *Neglect*, or *Poverty* of the parents. It may appear harsh to the poorer classes to make this statement, but I am convinced of its substantial truth. *Ignorance* is exhibited in the faulty mode of feeding young children, so prevalent amongst all except the educated classes. A larger number of all the deaths arise from this cause than from all the others put together. With regard to exposure to cold, poverty on the one hand, and vanity on the other, are accountable for most of the seventy-five deaths from this cause. But if we call to mind the great number of deaths amongst the children of artizans, poverty is excluded, whilst ignorance and neglect remain. Now, neglect may be of two kinds, the neglect that arises from ignorance, or that which arises from vice—criminal neglect. In the case of artizans earning good wages, and whose wives remain at home, neglect must be involuntary, from ignorance; in the case of illegitimate children, mostly put out to nurse, I fear the vicious or criminal element sometimes comes in.

Here are a few actual specimen cases illustrating the above.

1st. Feeding.—An illegitimate child, out at nurse, dies at three months old. Asked what the child was fed upon, in the absence of the mother's milk, the

* My observation of the working classes, both urban and rural, convinces me that the children of the artizans in towns are infinitely worse fed and managed than those of the rural poor. The artizan generally marries a girl who has worked in factories, or in some employment other than domestic service; and the result is that the young wife is generally about as well taught in all that relates to the management of an infant as the infant itself! Very often, too, she continues the factory labour after marriage which she pursued before. The women of the agricultural class are much better informed, by mixing with their superiors, in all the arts of domestic life.

woman replies, 'Oatmeal, Sir!' 'Oatmeal for a child of three months?' 'Yes; is it not considered strengthening?' I need not say that the infant died *starved to death. Life insured.*

2nd. Neglect from Poverty.—A number of children huddled together by the fire in a wretched cottage, the baby lying on a heap of rags which do not appear ever to have been washed, *and upon which another child has recently died of diarrhœa!* Mother out all day at work to earn a pittance for these truly destitute infants.

3rd. Neglect from Ignorance and Vanity.—It is not uncommon to see the children, even of well-to-do artizans, left at home to take care of each other, the mother and even the eldest daughter, perhaps, being out at work at a factory or shop in order to increase the family income. Some of these earnings go to procure gaudy dresses for the wife and daughters, whilst the infants' arms and legs are bare!

4th. Neglect of Medical Aid.—Certain diseases require immediate medical aid. Amongst such are summer diarrhœa and disorders of the lungs. It is notorious that instead of seeking speedy help in this respect, the case is too often allowed to run on to an approaching fatal termination before medical aid is called in. This is the more inexcusable, as, by means of the Provident Dispensaries, good medical aid can always be had, and there are the Union Officers for the very poor.

I must also allude to the questionable habit of insuring the lives, as it is called, of young infants, so as to provide a sum, *often much larger than is required*, to pay the costs of their burial. This insurance of the lives of infants has been called *insurance of their deaths;* but I have not data sufficient to pursue this part of the subject.

Such, in my opinion, being the causes of our excessive infantile mortality. what remedy or remedies can be suggested for this lamentable social condition? An elaborate system of visiting and inspecting the abodes of the poorer classes has been adopted of late years, and infectious disorders are fairly well hunted up, and, in some cases, have been cut short by prompt isolation. Nevertheless, the fact remains that the infantile mortality of the city is always excessive, and that after making all allowances for bad dwellings and crowded streets, and for a certain amount of poverty, there remains a large proportion of deaths which cannot be accounted for by any shortcomings in those respects.

If I am right in stating that Ignorance—ignorance of the right method of feeding infants and young children; their neglect by some of the mothers through poverty, or vice; the foolish notions as to children's dress arising from female vanity; the reckless exposure to cold attendant upon the gratification of that vanity; and, on the other hand, the confinement of infants on a heap of dirty rags in close rooms whilst the mothers or elder children are at work—are really accountable for the greater part of this mortality, which is so much to be deplored, what remains to be done?

No doubt, frequent and searching visits by the sanitary officers should be made to see that the *interior* of the dwellings are kept in a wholesome state. For this purpose, I am continually endeavouring to enforce whitewashing, and other cleansing, by the inhabitants themselves, instead of leaving it to the disposition of the landlord, or his agents. Overcrowding, also, must be strictly forbidden, whether in private houses or in common lodging-houses.

But more than this is required. We want the aid of the educated classes to instruct the uneducated in the first principles of the laws of health, and in the management of infants and their food. We want, especially, the ladies in each parish to take a more active interest in the condition of their poorer neighbours. The District Visitors in each parish could render much aid. The friendly visits of matrons will not be resented by the poor when they find that *advice* and not *dictation* is tendered.

Postscript.—With regard to Worcester, I am happy to be able to add to my paper, which otherwise would have ended here, that, in accordance with the advice I gave, an 'Auxiliary Health Society' has been formed, principally by the aid of the parochial clergy and their district visitors. I am pleased to record that the ladies came forward most readily, and, after receiving some instruction in the broad principles of household sanitation for themselves, they have disseminated this information amongst their poorer neighbours, both orally and by means of tracts published by the National Health Society of London. The Mayor has kindly patronised the young society, and the General Health Committee of the Town Council lend it their assistance. The society began operations in July last; some eight or nine lectures were given by myself to the poorer inhabitants in each of the parish school-rooms, which were well attended and listended to. As a result, at least in part, of our operations, I am to-day able to announce that the deaths of children under five years of age which, in 1878 amounted to 350, and in 1879 to 235, were reduced in the year ending this day, that is, the latter half of 1879 and the first half of 1880, to 210, or no less than 144 under the deaths in the fatal year of 1878!*

A discussion on Dr. Strange's paper then ensued. Dr. Fenton concurred with Dr. Strange that improper feeding was a fruitful cause of death, and, with reference to mothers leaving their children at home and going to work, instanced the fact that at Coventry, during one year when the ribbon trade was at a standstill, and mothers who had been accustomed to work in factories stayed at home, the death-rate from infantile diarrhœa fell from 10 per cent. to 1 per cent. (See SANITARY RECORD, March 15, 1880.) The voluntary efforts of Dr. Strange were very creditable to him, and had borne good fruit, which no doubt was the result of education. He hoped it would result in the establishment of Health Societies in other places.

Dr. Wilson said that Dr. Strange had conclusively proved that the excessive infantile mortality did not depend upon insanitary conditions connected with the town, as regarded either drainage, soil, or water supply; and that the excessive infantile mortality depended, in a far greater measure, upon the gross negligence and ignorance of parents than upon any other single cause. Dr. Strange had adopted the best means of combating this by instituting the Auxiliary Health Society, and he congratulated him upon the apparent good results.

Dr. Swete strongly condemned the erection of houses—usually of the class tenanted by artizans—upon rubbish heaps, and suggested that infants were seriously affected by the poisonous gases rising

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* Last half of 1879 .. .. .. 95 deaths.
First half of 1880 .. .. .. 115 deaths.
210

No. of births in 1879, 1216.
The rate of deaths under 1 year to 1000 births in first half of 1880 = 128.

through the floors, which infants, being in a cradle or cot, close to the floor, would necessarily inhale. He observed that there was such a site on the Arboretum, which was being filled up with every possible abomination, and would, he expected, be shortly used for housebuilding. He also condemned the horribly dirty wall-papers which he saw in some houses, which being of a common sort were highly absorbent, and might be another factor in causing the deaths of infants in houses where the mothers worked at home with the windows closed and there was very little ventilation. Colouring or whitewash was preferable. He quite agreed with Dr. Strange as to improper feeding, but urged that he ought not to overlook the position of the houses as to soil, and he contended that all plans of houses should be submitted to the Medical Officer of Health in order that he might control the sanitary arrangements.

Dr. Bond had a strong impression that no small amount of the large mortality of infants from diarrhœa was due to the baneful influence of feeding-bottles, fermentation going on in them so much more rapidly as the temperature rose, and the food in that condition affecting injuriously the digestive organs. Infants should be fed more on milk, and if care was taken to prevent fermentation, and to give it fresh and at proper times, the infantile mortality might be reduced to a large extent.

Mr. May said he could not fail to come to the conclusion that this was a social rather than a sanitary question. Dr. Strange had been the connecting link between the outside philanthropic individuals and the Sanitary Authority, and in doing so he had honoured and dignified his position as Medical Officer of Health. He reminded Dr. Bond it was found that at Leicester diarrhœa was as prevalent among the breast-fed children as among those who were fed from the bottle.

Dr. Haynes suggested whether the infantile mortality was not to some extent connected with the amount of wages earned. In times of prosperity, when high wages were earned, many parents indulged in drink and neglected their children, whereas when wages were low the parents were at home more and neglected their children less. Dr. Haynes also hinted that contagious diseases in certain classes of the people might affect the death-rate.

Dr. Strange, in the course of his reply, said he thought there should be a public crèche in Worcester. He pointed out that in the country the infantile death-rate was much lower than in the city, and this was partly accounted for by the fact that while in the country girls and young women were accustomed to the bringing up of children, in Worcester, many young women employed in factories, when married, knew as much about the management of a baby as a baby itself. The Town Council, he explained, had recently passed a by-law to prevent houses being built on such a foundation as Dr. Swete had described. He contended that all sanitary arrangements connected with new houses should be submitted to the Medical Officer of Health, and he (Dr. Strange) had made it a rule that no house should have an opening from the sewer within the house itself, but that the kitchen sink should discharge outside the building. With regard to Worcester, there was not the slightest difficulty in the authorities adopting such arrangements as were brought under their notice. He quite agreed with a previous speaker in condemning feeding-bottles. With regard to congenital syphilis—which had been referred to—his experience was that there were very few cases amongst children of the poor. But he had met with a great deal amongst children of the well-to-do. In conclusion, Dr. Strange observed that, to advance sanitation, they must induce the people to learn how to manage their homes and their children as they ought to do.

A vote of thanks was accorded to Dr. Strange for his paper, and for his hospitality, he having previously entertained the members, on the occasion of this their first migration from Birmingham, where the meetings have hitherto been held.

THE

SANITARY RECORD.

AUGUST 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

HOLIDAY RESORTS.

It has been remarked of late that the custom of leaving England for a summer holiday is not as general as it used to be. Unfortunate instances have occurred when one's friends have found the Continental hotels and watering-places are not in any way more healthy than our own; money matters may also have had a tendency in the same direction, and people have taken more to remaining in England; they have enjoyed their holiday, and have become better acquainted with their own country than they were before.

Driving tours have become far more popular than they used to be. The prohibitory prices paid at hotels (prices usually grounded more upon what the travellers are willing to pay than on the cost of the article provided), and the deterioration of roads since the abolition of turnpikes, act rather against one's enjoyment; still, when these can be put up with, this way of seeing the country, and of enjoying a probably well-earned holiday, is most useful and enjoyable.

Cornwall is a county which is little known in this respect: it lies far away. Most people have heard that it is a 'mining county', and assimilated it in their minds with our 'black country'. There can be no greater mistake; and if any hard-worked individual can afford the time and the money, there can be no more delightful a trip than to leave Plymouth, driving, and to visit Falmouth, the Lizard, the Land's End, and up the West Coast, through St. Columb, Tintagel, Boscastle, and Bude, to North Devon, and there ending with Lynton and Lynmouth.

The air of Cornwall is particularly fine and invigorating, the valleys in some places are beautifully wooded, and often spanned by those extraordinary fairy-like wooden railway viaducts, which seem peculiar to that county and to South Devon; but as a rule the country is high and open, and the fine fresh air can blow freely from the Atlantic across to the English

Channel. Some of the views from the high grounds, on account of the extent looked over, are particularly striking. The coast scenery is now tolerably well known. The roads are good, perhaps the best in England. The hotels are, if anything, rather less expensive than in other favourite resorts. We need not particularise places, but it would be difficult to forget or to describe the feeling when gazing over the bay from one's window at the Falmouth Hotel, or when lying on the grass at the top of King Arthur's Castle, and looking for miles over the Atlantic.

For those who do not drive, we may mention that the railway and coaches will take the traveller to almost every place worthy of a visit.

Before concluding, we must, however, point out to the various Local Authorities that, as a rule, Cornwall is behindhand in sanitary matters. We regret to say that, generally, the streets in towns are dirty; after market days their condition is particularly bad. Some water turned on, and a few men paid as scavengers, would greatly improve matters. In one of the small fishing villages near Penzance, through which our fate took us on a Sunday afternoon, the smells were simply abominable. Even in newly-built hotels there seems to be a total ignorance as to the use of traps, ventilating pipes, and of soil pipes brought up to above the roof; bath-rooms and water-closets are placed in suspicious proximity, and in one instance there was a decided smell in those places, which most plainly said 'drains'. All this is bad enough, but our cup was full to overflowing when we found, in one of the largest and most important towns, in two of the principal hotels in the place, the water-closets were lighted from and ventilated into the passage! As to where the soil-pipes went, we did not stay to enquire. We know that it will be said that there are old-established and old-fashioned houses, and that 'no bad effects, etc., etc.'; with all this we have nothing to do; we have only to repeat that this is a disgraceful state of things to be allowed to exist in 1880, and that the Sanitary Authorities should lose no time in having it remedied.

Local Boards have lately moved in the matter of having the sanitary arrangements of hotels and lodging-houses placed under medical and professional inspection, but some members of these Boards look upon this course as an infringement of the liberty of the subject. It is almost useless to urge the Local Government Board to move in the matter; but we cannot help thinking that our medical men in London and in towns might do good in this matter. Before recommending their patients and friends to any of our numerous winter or summer places of resort, let them write and enquire from the medical authority of the place whether the sanitary arrangements of the place are good, and more especially whether in the hotels and lodging-houses these matters are under professional supervision. If this was only more done than it is at present, we have little doubt that matters might be safely left to right themselves.

WATER-SUPPLY TO LARGE COMMUNITIES.

THE Registrar-General's weekly return of the deaths in twenty of our largest English towns shows a rate varying from fourteen to twenty-nine, Manchester and Liverpool being at the bottom, or nearly at the bottom, of every list for years back.

The reason why these two towns should have so high a death-rate is becoming a subject of such vast importance that every scrap of reliable information which will tend to throw light upon it is well deserving of attention.

Liverpool possesses natural advantages, as regards health, over most large towns; and the reason why it stands in such an unenviable position offers a fair field for sanitary investigation; more especially as the percentage of deaths amongst infants show but too unmistakably the defective nature of its sanitary arrangements. Few towns in England are so well situated for the carrying out economically all that is necessary for the health of the inhabitants and the encouragement of trade. An ample supply of unobjectionable and perfectly wholesome water can be obtained, without limit, from properly constructed deep wells, for all domestic uses; surface water in abundance is at command for manufacturing purposes; and salt water from the river Mersey can be had for the mere cost of plant and pumping. Yet, with all these advantages, we see that the Liverpool Water Committee are not satisfied, but are now preparing to carry out a scheme for drawing water from a Welsh river (the Vyrnwy) some sixty miles distant, at a cost far in excess of what would be required to make Liverpool a model city as regards water-supplies and their distribution for all domestic, trade, and sanitary purposes, the reconstruction of its defective sewers, and the sweeping away of much of the cottage property which now stands upon ground sodden by leakages from defective sewers.

We have yet much to learn on the subject of water-supply, and its free use without wanton waste. A letter which we publish, with illustrations, at page 76, is worth attention. If the class of inhabitants to which it refers, who were supposed to use or waste from twenty to thirty gallons a head per day, cannot, when brought to an accurate test, be induced to use more than two-and-a-half gallons, it proves that waste of water is not to be laid to their charge.

We shall be glad to publish letters on this subject from those who, from long experience and from practical knowledge, can give reliable information.

NOTES OF THE MONTH.

VENTILATION OF THE UNDERGROUND RAILWAY.

The state of the Metropolitan underground railway, as regards its unventilated condition, has been several times deplored in our columns, and we have also mentioned an instance where some amelioration of the evil was attempted by the engineer of the company. But the true remedy has not even yet been discovered, and we are not surprised that the attention of the President of the Board of Trade has been called to the matter by Sir Trevor Lawrence in the House of Commons. The reply which he received was, however, far from satisfactory, as it was to the effect that the attention of the Department had not been specially directed to the matter; had no authority to deal with it; had no responsibility in

regard to it, and moreover no funds to carry out any examination. This is, no doubt, the fact, but it is a sad fact nevertheless, and carries disgrace with it. Apparently, not until some person is taken out dead from a carriage, which the foul air has filled long enough to bring about that result, and until the authorities belonging to the railway are arraigned on a charge of manslaughter, will the question of responsibility be settled, or effective steps taken to remedy the evil. Mr. Greenwood, of St. Bartholomew's Hospital, London, writes to a contemporary, that it would be comparatively an easy matter to properly ventilate even the worst portion of the present railway, namely, between Baker Street and Gower Street, and that some pressure should be brought to bear on the railway company in order to enforce improvements. We would suggest that a penny subscription be raised, payable at the shop of some sympathetic tradesman in the vicinity of each station, with a view of defending the first action at law. Mr. Greenwood can certify, he says, from professional experience that the atmosphere in the tunnel is poisonous; and this being the case, very well corroborated by others for years past, surely it would be a simple matter to commence litigation, and so test the law. Something remedial must be done at once, for it is a positive disgrace to allow things to remain as they are. We are not blind to the fact, that it is the frequent passing and re-passing of trains in the tunnels which churns the air over and over again, and prevents a constant inlet of fresh and outlet of foul air, but surely some working scheme can be found to meet this condition. If not, trains should be run less frequently, and time given for the atmosphere to be renewed. It will be a serious matter for London, if the New Inner Circle Completion Railway be provided with equally defective means of ventilation, but doubtless the whole subject will now be duly considered. If the new underground line can be passed as satisfactory by the railway inspectors at the opening, we hope a certificate will be withheld until the sister tunnels are all satisfactorily decided.

WATER FROM THE CHALK.

The authorities of the Brookwood Lunatic Asylum, Surrey, with the object of obtaining a supply of pure water for the use of the asylum, have determined to sink a well and bore-hole on their premises. The well, which has already been commenced, will be of unusual size, the largest size of cylinder to be used being 9 ft. in diameter. The shaft will be sunk to the chalk, which is supposed to be at about 400 feet from the surface at this point, and will be continued in that strata by a bore-hole of suitable diameter. Several reliable authorities have given it as their opinion that a supply of water fully equal to the demands of the asylum will be found in the chalk. The contractors for the work are the Diamond Rock Boring Company.

WOMEN AS SANITARIANS.

President Gilman, in his address at the Smith College, (U.S.A.), remarked (as reported in the *American Plumber and Sanitary Engineer*): 'Education must be secured through good living, obedience to the laws of health and recreation. The housewife should be educated so as to be able to prevent the ailments of those who dwell under the same roof with her. As every young man must expect to qualify himself to support a household, so must every young woman strive to render herself fit to manage the affairs of the house. The relations to each other of all the things which affect good living must be understood, food, air, water, exercise, etc., in order that all emergencies may be provided for. All those things which we call modern improvements, gas, water surface furnaces, books, newspapers, magazines, and other manifold accessories of the household must result in bad odours, noxious gases, headaches and a host of other ills, unless their right use is understood and insisted on by the ever watchful housewife. All sanitary reforms must rest on the shoulders of the women of the country.' It will be noted that Mr. George Palmer, M.P. for Reading gave utterance to similar sentiments at the recent meeting for the Parkes' Museum of Hygiene. A practical application of women's work in the sanitary field may be observed in the useful though unobtrusive labours of the active ladies' committee of the National Health Society.

THE TRANSMISSION OF SCARLATINA BY WEARING APPAREL.

Dr. Mac Cabe related a striking instance of the transmissibility of scarlatina by this means at the inquiry into the Dublin sewerage and drainage. It appears that he was sent for to see a lady suffering from an attack of scarlatina, and when he told her husband the state of the case, he, to use Dr. Mac Cabe's expression, laughed him to scorn, and asked how she could have got it. On investigation, Dr. Mac Cabe found that a youth of the family had returned from Rugby, because the school he attended was shut up in consequence of an outbreak of scarlatina. He had not had the scarlatina himself but had brought it over. The doctor called at the same house a few days after and found a ball-dress lying on the lady's bed, which had just been sent in from a Dublin firm. The patient said she was looking at it to see if it was made in accordance with her directions, and that it was for a lady in Belfast. The dress was accordingly sent to Belfast, but with an unexpected addition of zymotic poison, and the young lady who received and wore it died of scarlatina.

DILUTE SULPHURIC ACID AS A REMEDY FOR SCARLATINA.

Mr. B. Clarke, M.R.C.S., draws our attention to an error in the description of his plan of administering dilute sulphuric acid as a remedy for scarlatina (page 17, part 13). The formula he advises is Infus. Rosæ comp f℥viij; Acid Sulphuric dilut. f℥ij; and perhaps f℥ij of Syrupus Simplex; one or two tablespoonsful to be given every four hours according to age.

THE HOMES OF THE POOR.

Dr. Blaxall, of the Local Government Board, has recently issued a report on a very serious epidemic of scarlatina in the two towns of Swindon, which seems to have been allowed to pursue its course almost unchecked, the hospital provided for infectious cases lying idle, the Medical Officers of Health being quite careless about the epidemic, and the authorities taking no measures to prevent its spread. In the course of his inspection, Dr. Blaxall found several inhabited cottages to be very old and much in want of repair, a notable and shocking instance of which is to be found in one, of which he gives the following description: 'Westcott cottage is a solitary dwelling, situated about half a mile from the town, and occupied by an agricultural labourer, his wife and family. Here three of the children died of scarlatina during the recent epidemic. I visited the cottage, and found the

ceiling of the bedroom wet. It appeared that rain came in at the roof, and I was told that in winter the walls would run with water, which would sometimes freeze and remain a sheet of ice so long as the frost lasted. At a meeting of the Authority on the 15th October 1879, this cottage was specially referred to in connection with the three deaths that had recently taken place in it from scarlatina; and a member of the Local Board then reminded the Authority that an infant had died in this cottage in the previous March, the death being the subject of a coroner's inquest. At this inquest the medical attendant on the case gave it as his opinion that the cause of death was inflammation of the throat, a fact not to be wondered at, he said, looking at the wretched state of the house the inhabitants lived in. The door had no fastening, and could not be shut to keep out the wind, and the water came through the roof in streams. Whilst he was in the bedroom attending to another child, then apparently on the point of death, as much as a couple of buckets of water came through. The mother said she had complained of this for the last six months, but nothing had been done. The jury returned a verdict of death from inflammation of the throat, and strongly advised the mother to make further representations to her landlord as to the state of her house.' Now this was the condition of things described as existing in March 1879, and again brought under the special notice of the Authority on the 16th October as unremedied: and yet up to the date of Dr. Blaxall's visit, on the 5th November, no action had been taken to render the cottage fit for habitation; and the family, after having buried four children since the beginning of the year, had the prospect of facing another winter with the cottage in the same dilapidated condition.

SEWAGE FARMING IN THE ENVIRONS OF PARIS.

The City of Paris has tried various chemical and other means of dealing with its sewage, and is now irrigating about a thousand acres of land within five miles of the Tuilleries. In furtherance of this scheme, on the 23rd of June last the Municipal Council of Paris resolved among other things: 'To approve, first, the continuation of irrigation in the fields of Gennevilliers and the carrying of the sewage to the lower north-western part of the Peninsula of St. Germain and adjoining farms, and the delivery of sewage from the conduits to persons on their routes, who shall be willing, by agricultural, chemical, or other means, to cleanse it at their own expense and risk for the sake of what they may be able to get out of it, subject to rules to be prepared. Second, to ask the Government, in case the 1,500 nectares (3,700 acres) might be insufficient for the purification of the sewage without annoyance to the neighbourhood, to take into immediate consideration the extension of the present proposal and the irrigation of other districts in the Valley of the Seine.'

HOMES FOR THE WORKING CLASSES.

We are glad to find that the system first put in practice by Miss Octavia Hill, of purchasing dilapidated houses, rendering them fit for habitation, and letting them out in tenements to the working classes, has spread to America. We read in the *Plumber and Sanitary Engineer* for July 1st, that 'some very valuable efforts are being made in the quietest manner to improve the condition of the worst tenement quarters in New York, and with excellent prospects. Mrs. Miles' success with her first houses in Mulberry and Park Streets has been more than equalled in Gotham Court, which under her management has been cleared of its disreputable occupants, who have been replaced by a more decent, orderly and paying class of tenants. The houses have been put in good order, and a thorough reformation made. The income from the property is greater than ever before, while its value has been enhanced from the better repair in which it can be kept. Meantime, two other ladies have leased one of the worst buildings in the Five Points region, which had been used as a low lodging house for the vilest class, and which reeked with the foulest odours, with the intention of changing it into a decent and habitable dwelling. To put this place into even fair condition has been a difficult work. The walls have had to be scraped and the whole building fumigated to kill the vermin and remove contagia; the yard had to be repaved, an old shed used as a bone-house torn down, the privy cleaned out, and a school sink substituted. It is proposed to lease the lower floor as a shop, and to let the upper rooms to families; and we anticipate great benefits from the undertaking.'

A SWIMMING GUILD.

The Borough of Tynemouth has set an example worthy of imitation by other seaport towns and places situate near deep waters, where the risk of drowning is greatest, and proficiency in swimming is most needed. A swimming guild has there been established to encourage the art of swimming. Every one who can swim a hundred yards in the open sea is entitled to a certificate of competency and a medal; his name will also be entered on the roll of experts kept at the free library. It is also proposed to keep another roll of honour, containing the names only of those who have been instrumental in saving life, or have otherwise distinguished themselves in the service of humanity. Mr. Alderman Shotten, the founder, is president of this laudable institution.

THE ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS.

At a meeting recently held at Newcastle it was determined to establish a northern branch of the Association of Municipal and Sanitary Engineers. The proposed district association will comprise the municipal engineers and surveyors, and the Local Board surveyors in the counties of Northumberland, Durham, North Riding of Yorkshire, Cumberland, Westmorland, and Berwickshire. It was agreed that the first meeting of the district association shall be held at Darlington, at no distant date. Papers on sanitation have already been promised.

THE HEALTH OF SHANKLIN.

A gratifying quarterly report as to the salubrity of the town and district of Shanklin has been presented by Dr. Meeres, the medical officer. The report stated that in the district, which has a population of about 3,000, there had been only nine deaths registered during the quarter. Of these, four were infants under the age of five years, two were above 60, one was a visitor, and another was that of an inhabitant of Sandown, who was drowned while canoeing in the bay, and whose body was brought to Shanklin; thus leaving only one death between infancy and old age among the permanent residents of the district, during the months reported on.

WORKING MEN'S DWELLINGS AT ALNWICK.

Comment has frequently been made on the wretched condition of many of the houses inhabited by the labouring classes in Alnwick, and has naturally excited the attention of the Local Board. We are glad to be able to report that the Duke of Northumberland has munificently decided to set apart certain sites in the town of Alnwick which he proposes to sell on moderate and easy terms to working men only, in order that they may erect thereon improved dwellings to suit their requirements and become their own landlords. His Grace has already sold several sites in various districts in the county of Northumberland at nominal rates for this laudable purpose, but unfortunately many of them fell into the hands of speculators, and the working classes have reaped but little benefit from his good intentions.

SEA WATER IN TOWNS.

The corporation of Tynemouth now supply salt water to all who require it from their mains in the principal thoroughfares of Tynemouth and North Shields. The water is extensively used for flushing the sewers, watering the streets, supplying the public baths, etc.

THE PUBLIC HEALTH
DURING JULY 1880.

The mean temperature at the Royal Observatory, Greenwich, during July was 61°.7, against 63°.1 and 58°.1 in the corresponding months of 1878 and 1879, and was almost identical with the average July temperature in 100 years. The mean was constantly below the average during the first thirteen days of the month, while it showed an excess on twelve of the last eighteen days. The coldest day of the month was Friday 4th, when the mean was 57°.4, and 4°.1 below the average; and the warmest day was Tuesday 27th, when the mean was 65°.8, and showed an excess of 3°.2. Rain was measured at Greenwich on twenty-four of the thirty-one days in the month, to the aggregate amount of 3.8 inches, which exceeded by 1.2 inches the average July rainfall in sixty-one years. Rain has not been measured on so many days in any month since November 1872; the amount of rain was almost the same as that recorded in July 1879, when 3.7 inches were measured on nineteen days. The sun was above the horizon during 496.8 hours last month, and 169.2 hours of bright sunshine were recorded; this showed an increase of nearly seventy hours upon the exceptionally small amount of sunshine in July 1879. South-westerly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing an estimated population of about seven-and-a-half millions of persons, or nearly a third of the entire population of England and Wales, 20,418 births, and 11,960 deaths were registered during the four weeks ending 31st July. The births were equal to an annual rate of 35.5 per 1,000 of the estimated population in the twenty towns. The birth-rate was 35.7 in London, and 35.4 in the nineteen provincial towns; it ranged from 25.2 in Brighton, to 38.5 and 39.0 in Liverpool and Leicester. The mean annual death-rate, during the four weeks of July, was but 20.8 in the twenty towns, against rates declining steadily from 29.0 to 19.1 in the five preceding months. The average July death-rates, in the twenty towns, were 20.8, 24.2, and 17.6 per 1,000 respectively, during the three years 1877-8-9. The death-rate in these large towns, last month, showed a slight increase upon the low rate that prevailed during June, mainly the result of a marked increase of diarrhœa fatality.

The lowest annual rate of mortality, in the twenty towns, during July, was 15.7 in Hull. The rates in the other towns, ranged in order from the lowest, were as follow:—Bristol, 15.9; Birmingham, 17.4; Portsmouth, 17.4; Bradford, 17.7; Sheffield, 18.1; Newcastle-upon-Tyne, 18.3; Nottingham, 18.6; Leeds, 19.2; Plymouth, 19.3; Wolverhampton, 20.1; Leicester, 20.2; Brighton, 20.9; London, 21.3; Manchester, 21.5; Salford, 21.5; Sunderland, 22.6; Oldham, 25.1; Norwich, 26.0; and the highest rate during the month, 26.3 in the city of Liverpool. In the nineteen large provincial towns, which have an aggregate population somewhat greater than that of London, the annual death-rate, during July, averaged 20.3, and was one per 1,000 below the rate in London; this was mainly due to the greater fatality of diarrhœa in the metropolis. The high death-rate in Norwich was, in great measure, due to zymotic fatality; whereas the excess in Oldham and Liverpool cannot be attributed to the same cause.

The 11,960 deaths from all causes, in the twenty towns last month, included 2,609 which were referred to the seven principal zymotic diseases; 1,355 resulted from diarrhœa, 488 from scarlet fever, 299 from whooping-cough, 253 from measles, 142 from fever, 57 from diphtheria, and 15 from small-pox. These 2,609 deaths were equal to an annual rate of 4.5 per 1,000 in the twenty towns during the four weeks under notice, against 3.0 in each of the two preceding months. The zymotic death-rate, which was equal to 5.1 per 1,000 in London, did not exceed 4.0 in the nineteen provincial towns. The excess in London was mainly due to diarrhœa fatality. The annual death-rate from these seven diseases, during July, did not exceed 2.0 in Newcastle, 2.3 in Plymouth, or 2.4 in Bristol and Wolverhampton; while it ranged upwards to 5.8 in Leicester, 6.2 in Brighton, 6.4 in Salford, and 8.4 in Norwich. The annual death-rate from diarrhœa (principally of infants) averaged 2.4 per 1,000 last month in the twenty large towns, and was equal to 2.9 in London, while it did not exceed 1.9 in the provincial towns; it was but 0.3 and 0.9 in Newcastle-upon-Tyne and Bradford, whereas it was equal to 2.7 in Salford and Leeds, 2.9 in Norwich, and 4.1 in Brighton. The fatality of diarrhœa during last month showed a marked excess upon that which prevailed in July 1879, notwithstanding the moderate temperature, and the frequent and abundant rainfall. The 488 deaths from scarlet fever, in the twenty towns, showed a decline of 108 from the number returned in June; the largest proportional fatality from this disease occurred in Norwich, Salford, Sheffield, and Sunderland. Measles was somewhat more fatal in London than in the aggregate of the nineteen provincial towns; it showed, however, the largest excess in Leicester and Sunderland. The deaths from whooping-cough were proportionally most numerous in Liverpool. No less than 38 of the deaths referred to diphtheria were returned in London; of the other 19, five each occurred in Birmingham and in Leicester. The 142 deaths from fever showed a decline of 41 from the number of fatal cases recorded during June; 66 occurred in London, and 76 in the nineteen provincial towns, which have an aggregate

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JULY 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence			Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,964,149	10,022	5985	2073	1082	*	*	*	9041	1443	14	137	249	88	129	66	810	706	608	183	952	35.7	21.8	5.1	2.5	
ABINGDON	6,033	16	8	2	1	..	..	2	3	2	..	..	..	..	..	..	2	..	1	..	..	31.3	15.6	3.9	0.0	W. T. G. Woodforde, M.D.
ACTON†	14,000	53	30	13	7	2	1	1	6	7	..	1	1	..	..	..	5	5	2	..	..	49.3	27.9	6.5	4.7	T. Francis.
ALTRINCHAM	12,000	31	26	4	8	4	..	2	8	6	..	..	4	..	2	..	..	3	..	..	..	30.4	25.5	5.9	2.9	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	103	68	22	16	2	2	17	9	12	..	..	3	..	2	3	4	3	9	..	3	36.3	24.0	4.2	1.1	W. H. Hughes.
ASTON MANOR	52,821	181	54	21	9	3	4	10	7	9	..	..	..	2	1	1	5	6	6	2	..	40.3	12.0	2.0	1.3	H. May.
AUDENSHAW	6,000	24	11	2	4	2	1	1	1	7	..	..	4	..	1	1	1	1	..	..	..	47.1	21.6	13.7	2.0	R. Slater.
BANBURY‡	13,500	*	14	2	1	1	1	3	6	1	..	..	..	..	..	1	..	..	1	..	..	*	10.8	0.8	0.0	R. Grimbly.
BANGOR‡	7,835	*	10	..	2	1	..	3	4	1	..	..	1	..	..	..	..	..	1	1	..	*	13.3	1.3	0.0	H. Rees.
BARNSLEY	30,000	100	50	16	8	*	*	*	7	11	..	..	4	2	..	2	3	6	8	..	6	39.2	19.6	4.3	2.4	M. T. Sadler, M.D.
BARROW-IN-FURNESS	40,000	168	70	33	14	4	4	10	5	11	..	..	2	..	1	2	6	5	8	2	2	49.5	20.6	3.2	1.5	J. Settle.
BATLEY	29,851	73	32	8	7	3	4	3	7	3	..	..	..	2	..	1	..	12	3	..	..	28.8	12.6	1.2	4.7	W. Bayldon.
BECCLES	5,000	15	8	2	1	..	1	4	..	..	..	..	..	..	..	..	..	..	1	1	..	35.3	18.8	0.0	0.0	E. B. Crowfoot, M.B.
BILSTON‡	25,000	81	36	10	6	2	2	11	5	12	..	..	2	..	1	3	6	*	..	..	..	33.8	15.0	5.0	*	W. M. Hancox.
BINGLEY	9,000	24	11	5	1	..	3	2	..	2	..	..	..	..	..	..	2	..	3	..	..	31.4	14.4	2.6	0.0	J. W. Craig, M.D.
BIRMINGHAM	394,738	1121	514	192	102	23	20	104	67	114	1	3	11	5	15	8	71	103	34	20	65	36.9	16.9	3.7	3.4	A. Hill, M.D.
BISLEY	5,264	16	8	2	1	..	..	1	4	..	..	..	..	..	..	..	..	1	1	..	..	35.8	17.9	0.0	2.2	T. Partridge.
BOLTON	106,500	340	188	62	34	11	7	51	23	55	..	7	7	..	10	..	31	16	13	8	1	33.3	18.4	5.4	1.6	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	44	15	7	2	5	7	8	6	..	1	..	1	1	1	2	5	4	2	..	*	19.5	2.7	2.2	R. J. Sprakeling.
BOSTON†	15,000	34	22	3	1	..	2	5	11	..	..	..	..	..	..	..	..	3	1	1	8	29.5	19.1	0.0	2.6	W. Clegg.
BRADFORD (LANC.)‡	15,000	68	32	15	8	1	1	4	3	8	..	..	1	..	2	1	4	2	2	1	..	47.3	22.3	5.6	1.4	J. Hudson.
BRADFORD (YORKS.)†	197,196	483	267	75	55	23	15	64	35	46	..	..	19	..	12	1	14	44	30	5	22	31.9	17.7	3.0	2.9	H. Butterfield.
BRAINTREE	5,000	*	4	1	2	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	*	9.4	0.0	0.0	J. Harrison.
BRENTFORD	11,557	27	18	7	3	1	..	5	2	9	..	..	..	..	2	1	6	..	1	2	..	27.5	18.3	9.2	0.0	J. Williams.
BRIDGNORTH	6,000	8	4	1	..	..	..	1	2	1	..	..	..	..	..	..	1	..	..	..	..	15.7	7.8	2.0	0.0	A. Mathias.
BRIDGWATER	13,000	37	23	6	5	2	1	4	5	6	..	5	..	..	..	..	1	..	1	2	5	33.5	20.8	5.4	0.0	F. J. C. Parsons.
BRIDPORT	8,145	12	4	..	1	..	..	3	1	1	..	..	..	..	..	..	1	..	..	..	..	17.3	5.8	1.4	0.0	G. M. Evans.
BRIGHTON†	107,321	207	172	62	*	*	*	*	31	51	..	2	9	1	2	3	34	*	*	3	16	25.2	20.9	6.2	*	R. P. B. Taaffe, M.D.
BRISTOL†	213,536	545	261	74	*	*	*	*	52	39	..	2	10	..	5	5	17	*	*	14	49	33.3	15.9	2.4	*	C. L. Baylis, M.D.
BROMLEY (KENT)‡	14,293	38	12	3	1	..	..	5	3	2	..	..	..	..	1	..	1	1	..	..	..	27.7	8.8	1.5	0.7	C. O. Baylis, M.D.
BROMSGROVE	6,967	19	5	1	2	..	..	..	2	1	..	..	..	..	..	..	1	2	..	..	2	32.1	8.4	1.7	3.4	C. Carey.
BURNLEY†	56,000	*	111	32	24	7	3	22	23	22	..	3	3	..	3	1	12	10	8	2	..	*	25.8	5.1	4.4	T. Dean, M.D.
BURSLEM	29,159	78	36	16	4	..	1	10	5	3	..	..	..	..	2	..	1	8	1	..	..	31.5	14.5	1.2	3.2	J. M. Taylor.
BURTON-UPON-TRENT	33,000	146	50	16	11	4	1	11	7	9	..	..	3	2	1	1	2	4	5	2	4	52.1	17.8	3.2	1.4	C. Perks.
BURY	50,000	181	86	16	14	*	*	*	14	15	..	2	3	..	4	1	5	13	7	4	9	37.7	17.9	3.1	2.7	H. Ashworth.
BURY ST. EDMUNDS	15,600	38	22	6	..	2	1	5	8	..	..	..	..	..	..	..	..	3	2	1	5	28.7	16.6	0.0	2.3	F. W. Clarke.
CAMBORNE	15,000	*	26	6	3	..	3	7	7	1	..	..	..	..	..	..	..	6	6	1	..	*	20.4	0.8	4.7	E. S. Angove.
CAMBRIDGE	34,500	79	48	18	8	..	1	5	16	12	..	3	1	..	6	..	2	7	1	4	5	27.0	16.4	4.1	2.4	B. Anningson, M.D.
CANTERBURY‡	20,962	60	20	2	3	1	..	3	11	2	..	..	..	..	..	1	1	..	..	1	7	29.9	10.0	1.0	0.0	F. Wacher.
CARDIFF	82,364	239	98	27	19	2	9	31	10	10	..	1	1	..	4	..	4	17	15	6	13	34.2	14.0	1.4	2.4	H. J. Paine, M.D.
CARLISLE†	35,000	91	52	9	8	7	3	13	12	5	..	..	..	1	1	..	3	4	8	2	10	33.9	19.4	1.9	1.5	R. Elliott, M.D.
CARNARVON	10,407	26	22	3	4	1	2	6	6	..	..	..	..	..	..	..	..	4	5	1	..	29.4	24.9	0.0	4.5	H. Rees.
CHELMSFORD	9,700	22	11	2	..	1	1	1	6	..	..	..	..	..	..	..	..	..	..	1	3	26.7	13.3	0.0	0.0	E. H. Carter.
CHELTENHAM	45,000	66	36	18	9	1	5	13	10	8	..	2	4	..	..	..	2	9	6	2	3	17.3	14.7	2.1	2.4	T. Wright, M.D.
CHISWICK	12,000	52	25	9	4	..	..	4	8	7	..	1	..	..	1	..	5	3	2	1	..	51.0	24.5	6.9	2.9	F. C. Dodsworth, Jun.
CIRENCESTER	7,000	*	9	1	..	..	..	4	4	1	..	..	..	..	..	..	1	1	1	..	3	*	15.1	1.7	1.7	F. T. Bond, M.D.
CLECKHEATON	9,250	25	15	7	3	1	2	1	1	4	..	..	..	..	..	..	4	1	..	..	..	31.8	19.2	5.1	1.3	H. O. Steele.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JULY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Cockermouth	5,550	*	7	1	1	1	..	2	2	..	..	..	..	..	..	..	..	3	1	..	..	*	14.9	0.0	6.4	J. Ward, M.D.
Colchester	28,924	84	47	5	12	10	5	9	6	20	..	1	17	..	..	..	2	6	9	..	2	34.2	19.1	8.1	2.4	E. Waylen.
Congleton‡	12,000	33	23	6	..	1	4	4	8	1	..	..	..	..	..	..	1	1	..	2	..	28.7	20.0	0.9	0.9	P. M. Davidson.
Consett‡	7,868	27	17	4	6	..	1	3	3	4	..	4	..	..	..	..	3	..	..	..	..	35.8	22.5	5.3	4.0	W. M. Renton, M.D.
Coseley	23,000	52	20	5	3	1	2	5	4	4	..	..	2	..	..	..	2	3	1	..	..	29.5	11.3	2.3	1.7	J. Eagleton.
Coventry†	41,000	114	49	11	9	1	2	9	17	7	..	1	..	..	..	..	6	9	6	..	5	36.2	15.6	2.2	2.9	M. A. Fenton, M.D.
Cowpen	5,000	17	7	1	1	..	..	3	2	..	..	..	..	..	..	..	..	1	2	1	..	40.0	16.5	0.0	2.4	H. D. Ward, M.D.
Crompton	10,000	18	9	3	1	1	..	1	3	2	..	..	..	..	..	..	1	..	..	..	..	21.2	10.6	2.4	0.0	W. Brooke, M.D.
Croydon..	71,000	215	85	20	10	3	3	22	27	5	..	..	..	..	2	..	3	6	15	1	20	35.7	14.1	0.8	1.0	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	*	4	1	..	1	..	..	2	2	..	..	..	..	1	..	1	..	..	..	..	*	12.3	6.2	0.0	L. Armstrong.
Derby	80,385	314	127	27	24	10	10	30	26	20	..	7	7	..	..	2	4	12	13	8	8	46.0	18.6	2.9	1.8	W. Iliffe.
Devonport	50,000	145	54	16	11	3	3	11	10	4	..	2	..	..	1	1	..	5	3	2	3	34.1	12.7	0.9	1.2	J. May, jun.
Dover	33,636	85	26	3	1	3	4	7	8	1	..	..	..	..	..	1	..	4	4	1	8	29.8	9.1	0.4	1.4	M. K. Robinson, M.D.
Droitwich	3,600	14	4	1	..	..	..	1	2	..	..	..	..	..	..	..	..	1	..	..	2	45.8	13.1	0.0	3.3	H. Swete, M.D., S.Sc.C. Camb.
Droylsden	8,000	31	9	1	2	1	1	1	3	1	..	..	..	..	1	..	..	..	1	..	..	45.7	13.3	1.5	0.0	R. Slater.
Eastbourne	18,000	*	28	6	4	..	..	14	4	2	..	..	..	..	1	1	..	3	8	..	2	*	18.3	1.3	2.0	E. F. Fussell, M.B.
East Dereham	5,791	13	5	2	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	26.4	10.2	0.0	0.0	H. B. Vincent.
Epsom	7,550	19	5	1	..	1	..	1	2	..	..	..	..	..	..	..	..	..	1	..	..	29.6	7.8	0.0	0.0	E. L. Jacob.
Evesham	5,000	*	8	1	..	..	3	3	1	..	..	..	..	..	..	..	..	..	1	2	..	*	18.8	0.0	0.0	G.H.Fosbroke,jun.,S.Sc.C.Cam.
Failsworth‡	8,000	*	13	3	4	..	1	2	3	2	..	..	..	..	..	2	2	1	1	..	..	*	16.9	2.6	2.6	G. W. Beattie, M.D.
Farnham	5,000	14	8	2	..	..	..	3	3	..	..	..	..	..	..	..	..	1	..	..	1	32.9	18.8	0.0	2.4	S. G. Sloman, Jun.
Fenton†	14,000	44	19	7	2	1	1	5	3	3	..	..	..	..	1	..	2	3	2	..	..	41.0	17.7	2.8	2.8	A. V. Griffiths.
Finchley	11,339	21	10	2	..	1	..	4	3	1	..	1	..	..	..	..	..	2	..	..	..	24.1	11.5	1.1	2.3	J. Turle, M.D.
Fleetwood	5,000	28	13	4	3	1	..	3	2	1	..	..	..	..	..	..	1	..	2	1	..	65.9	30.6	2.4	0.0	J. Porter.
Garston‡	8,500	29	12	4	1	..	..	5	2	1	..	..	..	..	..	..	1	1	1	1	..	35.6	14.7	1.2	1.2	J. A. Fisher.
Glossop	18,697	49	35	7	10	1	1	7	9	10	..	..	9	1	..	..	..	11	5	..	..	30.9	22.0	6.3	6.9	J. Rhodes.
Gloucester	37,907	112	55	14	4	1	3	14	19	3	..	..	1	..	..	..	2	6	8	2	5	34.8	17.1	0.9	1.9	J. P. Wilton.
Goole	10,205	26	18	5	..	2	4	3	4	2	..	..	..	..	..	1	2	1	3	1	1	30.0	20.8	3.5	1.2	J. Mitchell Wilson,M.B.,S.Sc.C.
Gorton‡	32,000	133	64	21	10	8	1	12	12	8	..	1	3	1	2	1	..	11	3	..	..	43.3	20.9	2.6	3.6	R. E. Hammond.
Great Driffield	6,033	20	8	2	2	2	..	..	2	2	..	..	..	1	..	1	..	..	..	..	..	39.1	15.6	3.9	0.0	D. Ridpath, M.D.
Halifax†	72,000	169	104	20	19	*	*	4	23	9	..	2	3	1	1	..	2	21	13	3	15	30.6	18.8	1.6	3.8	D. Ainley.
Harborne	6,000	14	7	1	..	..	..	1	5	..	..	..	..	..	..	..	..	..	..	..	3	27.5	13.7	0.0	0.0	R. W. Smith, M.D.
Haslingden	14,000	33	13	..	4	..	..	1	8	3	..	..	2	..	..	..	1	1	1	..	..	27.8	10.9	2.5	0.8	J. A. Harrison, M.D.
Heywood	23,000	*	26	7	2	2	2	5	8	1	..	..	..	..	..	..	1	4	2	2	..	*	13.3	0.5	2.0	H. Wisken.
Hinckley	7,500	25	5	3	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	39.2	7.8	0.0	0.0	W. H. Griffiths.
Hindley	12,000	58	35	10	6	6	2	9	2	10	..	..	4	..	..	2	..	4	2	9	3	50.4	30.4	8.7	1.7	J. G. Brayton.
Horwich	4,315	7	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	1	..	..	19.1	5.5	0.0	0.0	G. H. Whitaker.
Huddersfield†	81,780	219	148	28	33	14	12	29	32	16	..	4	2	..	2	2	6	22	14	4	16	34.9	23.6	2.6	3.5	J. S. Cameron, M.D., B.Sc.
Hull†	149,627	425	180	64	*	*	*	*	34	31	..	..	3	..	7	1	20	*	*	6	21	37.0	15.7	2.7	*	J. F. Holden.
Hurst	7,000	8	7	2	2	1	1	1	..	2	..	..	1	..	..	1	..	..	1	..	..	13.4	11.8	3.4	0.0	T. Cooke.
Hyde	28,200	93	87	34	19	9	5	10	10	31	..	19	7	2	..	2	1	20	4	..	..	38.8	36.3	12.9	8.4	J. Nield Cooper.
Ilfracombe	5,500	7	7	1	..	2	..	1	3	..	..	..	..	..	..	..	..	1	1	..	..	14.8	14.8	0.0	2.1	E. J. Slade-King, M.D.,S.Sc.C.
Ilkeston‡	12,356	47	29	13	5	..	..	7	4	9	..	3	..	..	..	1	5	..	..	1	..	39.7	24.5	7.6	0.0	R. Wood.
Ipswich	48,001	98	58	12	7	4	1	20	14	5	..	..	..	1	..	..	4	6	9	1	3	24.0	14.2	1.2	1.5	G. S. Elliston.
Keighley	24,000	64	42	13	7	2	2	11	7	4	..	..	1	..	..	..	3	11	3	..	3	31.4	20.6	2.0	5.4	A. Roberts.
Leamington	24,500	55	21	3	2	2	1	8	5	2	..	..	..	..	..	1	1	2	2	..	1	26.4	10.1	1.0	1.0	J. S. Baly.
Leeds‡	318,929	1134	566	185	99	*	*	*	86	90	..	1	13	2	5	7	62	87	49	29	*	37.1	18.5	2.9	2.8	G. Goldie.
Leek	12,527	58	27	4	5	1	..	13	4	2	..	2	..	..	..	..	..	..	7	..	3	54.5	25.4	1.9	0.0	J. J. Ritchie.

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‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JULY 1880—(*Continued.*)

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Leicester†	129,912	388	201	81	*	*	*	*	34	58	..	20	4	5	2	2	25	*	*	7	18	39.0	20.2	5.8	*	W. Johnston, M.D.
Leigh	20,400	62	35	10	10	3	1	6	5	12	..	4	2	..	1	2	3	3	3	..	..	35.8	20.2	6.9	1.7	J. Hall.
Lichfield	8,129	21	7	1	1	..	1	2	2	..	..	..	..	..	..	..	..	1	1	..	..	30.4	10.1	0.0	1.4	G. A. Carter, M.D.
Lincoln	32,103	104	55	16	7	6	5	13	8	9	..	..	4	..	3	1	1	1	3	2	9	38.1	20.2	3.3	0.4	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,000	8	2	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	23.5	5.9	0.0	0.0	C. Kelly, M.D.
Liverpool†	544,056	1607	1099	342	254	47	40	285	131	226	..	24	26	..	64	18	94	169	101	68	145	38.5	26.3	5.4	4.0	J. S. Taylor, M.D.
Liversedge	13,750	49	15	5	2	..	1	4	3	1	..	..	..	..	..	..	1	1	..	..	..	42.0	12.8	0.9	0.9	W. J. Sykes, M.D.
Louth	10,750	33	18	6	2	..	2	1	7	4	..	2	1	..	1	..	..	3	1	..	..	36.1	19.7	4.4	3.3	G. Domenichetti, M.D.
Luton	24,200	66	22	11	3	1	1	3	3	4	..	..	..	..	..	..	4	1	4	..	4	32.1	10.7	1.9	0.5	H. Sworder.
Lytham	5,000	10	9	1	..	1	..	4	3	1	..	..	..	..	..	..	1	2	1	..	1	23.5	21.2	2.4	4.7	W. E. Pountney, M.B.
Macclesfield	36,641	98	59	10	7	..	2	18	22	1	..	..	..	..	..	..	1	5	6	2	12	31.5	19.0	0.3	1.6	G. Bland.
Maidenhead	8,281	26	9	2	2	..	..	2	3	..	..	..	..	..	..	..	..	1	..	1	..	37.0	12.8	0.0	1.4	W. T. G. Woodforde, M.D.
Maidstone†	29,537	91	31	10	7	2	..	2	10	6	..	..	2	..	..	1	3	5	2	1	..	40.2	13.7	2.6	2.2	M. A. Adams.
Manchester†	363,130	1002	599	136	*	*	*	*	99	83	..	17	13	2	13	7	31	*	*	23	114	36.0	21.5	3.0	*	J. Leigh.
Merthyr Tydfil	52,000	143	94	19	19	9	4	24	19	9	..	5	1	..	..	3	..	13	5	3	3	32.4	21.3	2.0	2.9	T. J. Dyke.
Mexborough	6,000	29	8	2	3	..	1	1	1	..	..	..	..	..	..	..	..	2	1	..	..	56.9	15.7	0.0	3.9	W. Sykes.
Middlesbrough	58,988	187	97	33	31	6	5	17	5	35	..	15	5	..	7	1	7	14	4	5	8	37.3	19.4	7.0	2.8	J. A. Malcomson, M.D.
Middleton and Tonge‡	16,700	43	16	5	2	..	..	7	2	..	..	..	..	..	..	..	..	4	1	1	..	26.9	10.0	0.0	2.5	T. B. Knott.
Morley	12,100	52	21	6	3	2	1	7	2	4	..	..	..	..	..	..	4	2	2	..	..	50.6	20.4	3.9	1.9	S. T. Steele, S.Sc.C.Camb.
Moss-Side	16,500	39	12	1	1	2	..	5	3	2	..	..	..	1	1	..	..	1	2	..	..	27.8	8.6	1.4	0.7	A. E. Sutcliffe.
Neath	12,000	34	23	2	4	4	1	3	9	6	..	1	5	..	..	..	..	..	4	3	5	33.4	23.0	5.9	0.0	G. Ryding, M.D.
Newark†	13,746	41	20	7	4	..	..	5	4	3	..	..	..	..	..	..	..	3	2	..	..	38.9	19.0	2.8	2.8	A. Ashby, M.B.
Newbury	9,796	32	10	1	1	..	2	2	4	1	..	..	1	..	..	..	..	2	3	..	1	38.5	12.0	1.2	2.4	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	48	18	4	2	1	..	7	3	..	..	..	..	..	..	..	..	..	3	..	..	31.4	11.8	0.0	0.0	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	406	210	54	28	*	*	*	44	24	..	1	11	..	6	2	4	24	23	11	29	35.4	18.3	2.1	2.1	H. E. Armstrong.
Norwich†	85,827	205	171	53	*	*	*	*	38	55	..	1	23	..	7	5	19	*	*	3	13	31.2	26.0	8.4	*	T. W. Crosse.
Nottingham	173,627	635	280	110	26	17	13	56	58	43	..	8	7	..	4	1	23	37	32	9	23	38.1	19.0	2.9	2.5	E. Seaton, M.D.
Nuneaton	7,400	27	13	6	2	1	..	2	2	5	..	..	..	..	..	..	5	1	..	1	..	43.0	20.7	8.0	1.6	E. Peacock.
Oldham‡	115,413	358	288	81	88	17	15	58	29	58	..	11	18	..	13	..	16	81	24	8	21	32.3	26.0	5.2	7.3	J. M. Sutton, M.D.
Ovenden	8,000	20	3	..	1	..	1	1	..	..	..	..	..	..	..	..	..	1	..	1	..	29.5	4.4	0.0	1.5	J. Steele.
Oxford‡	37,500	114	54	13	1	2	4	16	18	4	..	..	..	..	..	..	4	1	5	3	9	31.7	15.0	1.1	0.3	A. Winkfield.
Padiham and Hapton‡	9,000	29	10	4	..	..	2	3	1	2	..	..	..	..	..	1	2	..	..	..	..	33.6	11.6	2.3	2.3	J. G. Booth.
Pembroke	15,000	43	23	4	2	3	2	9	3	3	..	..	..	..	..	1	2	2	4	1	2	33.8	18.1	2.4	1.6	D. P. Saer.
Penzance	12,000	34	30	19	4	..	..	4	3	12	..	..	..	..	3	..	9	2	1	..	..	33.4	29.4	11.8	2.0	G. B. Millett.
Peterborough	20,000	62	16	6	1	..	1	3	5	1	..	1	..	..	..	..	..	1	3	..	..	36.5	9.4	0.6	0.6	W. Thomson, M.D.
Plymouth†	74,993	183	111	33	13	3	10	29	23	13	..	..	..	..	1	2	10	9	11	3	10	31.8	19.3	2.3	1.6	H. Greenway.
Poole	11,350	33	16	4	2	1	2	2	5	..	..	..	..	..	..	..	..	1	2	1	..	34.2	16.6	0.0	1.0	H. A. Lawton.
Portsmouth	134,224	332	199	66	33	12	14	33	41	33	..	7	..	2	1	3	20	19	27	2	22	29.1	17.5	2.9	1.7	G. Turner.
Preston‡	88,000	343	212	89	43	9	8	34	29	68	..	1	5	1	6	5	30	23	17	4	6	40.6	25.1	8.1	2.7	H. O. Pilkington.
Ramsgate†	22,200	62	29	8	7	1	..	7	8	5	..	..	..	..	..	2	3	7	3	..	..	36.4	17.0	2.9	4.1	E. Walford.
Rawmarsh	9,652	26	9	6	..	3	..	..	..	1	..	1	..	..	..	..	..	3	..	..	..	31.7	11.0	1.2	3.7	W. J. Smith.
Reading‡	41,500	171	75	8	14	6	5	13	19	20	..	1	16	..	1	1	1	6	6	2	12	48.5	21.3	5.7	1.7	J. Shea, M.D.
Redditch	10,070	31	12	5	..	..	1	3	3	..	..	..	..	..	..	..	..	..	..	1	..	36.3	14.0	0.0	0.0	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	23	15	4	3	..	5	1	2	..	..	..	..	..	..	..	..	5	3	1	..	28.5	18.6	0.0	6.2	J. S. Hichens.
Reigate	18,000	33	17	3	..	1	1	6	6	1	..	..	..	..	..	..	1	3	3	1	1	21.6	11.1	0.7	2.0	E. L. Jacob.
Richmond (Surrey)	19,500	35	20	4	1	..	1	7	7	2	..	..	..	..	..	..	2	1	3	1	4	21.1	12.1	1.2	0.6	J. T. Rowland, M.D.
Rochdale	72,720	132	121	32	22	6	9	33	29	19	..	3	..	..	3	4	9	14	12	2	..	21.4	21.2	3.1	2.3	J. Henry, M.D.
Rochester	18,500	51	36	6	1	1	1	11	16	1	..	..	..	..	1	..	..	9	3	3	6	32.5	22.9	0.6	5.7	J. Sladen-Knight, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JULY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 Persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Romsey	4,481	11	3	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	2	..	..	28.9	7.9	0.0	0.0	F. Buckell.
Rotherham†	34,404	85	39	12	6	3	1	6	11	8	..	..	..	..	..	..	3	6	2	..	2	32.2	14.8	3.0	2.3	J. Hardwicke, M.D.
Rowley Regis‡	27,000	79	32	15	3	3	2	4	5	3	..	..	..	..	..	1	2	5	2	3	..	30.5	12.4	1.2	1.9	J. G. Beasley.
Rugby	8,916	28	13	1	1	1	2	5	3	..	..	..	..	..	..	..	..	3	..	3	1	37.0	17.2	0.0	4.0	G. Wilson, M.D.
Runcorn	14,000	55	31	16	..	..	2	9	2	8	..	..	..	..	..	8	7	1	3	..	..	46.3	26.1	6.7	5.9	R. H. Mouritz.
Rusholme‡	12,500	21	10	3	2	1	1	2	1	3	..	1	1	..	1	..	..	2	1	..	..	17.5	8.3	2.5	1.7	J. Gregory.
Saffron Walden	5,850	13	9	..	4	..	..	1	4	1	..	..	..	..	..	1	4	1	..	2	..	26.2	18.1	2.0	8.0	W. Armistead, M.B.
Salford†	185,786	514	307	90	83	26	10	67	31	91	..	8	28	1	10	5	39	43	33	12	30	36.1	21.5	6.4	3.0	J. Tatham, M.D., S.Sc.C.Camb.
Selby	5,720	11	8	3	1	1	..	2	1	..	..	..	..	..	..	..	..	..	..	1	..	22.6	16.5	0.0	0.0	J. Mitchell Wilson, M.B.
Sheffield‡	304,938	980	522	122	116	*	*	*	82	102	..	5	46	..	6	9	36	125	30	12	58	33.5	17.9	3.5	4.3	T. W. Hime, B.A. M.B.
Sittingbourne†	9,000	24	8	3	1	1	..	1	2	1	..	..	..	..	..	1	..	1	..	..	..	34.8	11.6	1.4	1.4	H. G. Sutton.
Smethwick	21,000	69	24	5	9	2	2	3	3	4	..	2	..	..	..	1	1	..	1	..	..	38.7	13.5	2.2	0.0	W. Sutton.
Southport	34,100	81	42	11	2	1	2	18	8	1	..	..	..	..	1	..	..	4	6	..	1	28.0	14.5§	0.3	1.4	H. H. Vernon, M.D.
Stalybridge	23,405	76	50	13	11	2	2	16	6	9	..	2	1	..	2	1	3	12	8	..	..	39.6	25.1	4.5	6.0	F. J. Roberts-Dudley.
Stratford-on-Avon	7,899	*	13	2	..	1	..	4	6	1	..	..	..	..	..	..	1	1	..	..	3	*	19.4	1.5	1.5	G. H. Fosbroke, Jun., S.Sc.C.C.
Stroud	7,608	13	8	2	..	1	..	2	3	..	..	..	..	..	..	..	..	..	2	3	4	20.1	12.4	0.0	0.0	T. Partridge.
Sunderland‡	116,730	429	255	70	63	28	12	46	36	54	..	18	13	..	5	2	16	31	23	10	23	38.3	22.8	4.8	2.8	H. J. Yeld, M.D.
Swansea	65,890	209	97	23	15	4	7	24	24	9	..	..	5	..	1	1	2	19	12	5	8	37.3	17.3	1.6	3.4	E. Davies.
Tamworth	4,846	16	11	4	2	..	..	1	4	1	..	1	..	..	..	..	..	2	..	..	..	38.8	26.7	2.4	4.9	H. J. Fausset, M.D.
Taunton	16,227	36	18	2	..	3	2	4	7	1	..	..	..	..	..	1	..	1	3	..	6	26.1	13.1	0.7	0.7	H. J. Alford, M.D.
Teignmouth	7,000	10	4	1	..	1	..	..	2	..	..	..	..	..	..	..	..	..	1	..	..	16.8	6.7	0.0	0.0	W. C. Lake, M.D.
Tewkesbury	5,500	12	3	1	..	..	..	..	2	1	..	..	..	1	..	..	..	..	..	1	2	25.7	6.4	2.1	0.0	W. Allard.
Tiverton‡	10,400	28	11	2	2	..	2	1	4	2	..	..	..	..	..	2	2	1	..	4	28 1	11.0	2.0	2.0	J. P. McNeill, M.D.
Torquay‡	26,000	*	32	7	10	1	..	3	11	12	..	8	..	..	2	1	1	2	1	..	..	*	12.8	4.8	0.8	P. Q. Karkeek.
Tottenham‡	37,000	155	53	17	9	3	6	8	10	11	..	2	..	..	3	3	3	8	4	1	1	43.7	14.9	3.1	2.3	C. T. Conolly.
Toxteth Park†	8,000	19	12	4	1	1	2	1	3	1	..	..	..	1	..	..	..	3	1	..	..	30.9	19.5	1.6	4.9	J. McClelland, M.D.
Tredegar	18,000	40	23	5	2	1	3	8	4	..	..	..	..	..	..	..	..	1	2	2	3	26.2	15.0	0.0	0.7	G. A. Brown.
Trowbridge†	12,000	30	20	5	..	1	1	4	9	..	..	..	..	..	..	..	..	2	1	..	..	32.6	21.7	0.0	2.2	G. C. Taylor, M.D.
Truro	11,049	18	7	1	..	..	1	1	4	1	..	..	..	..	..	1	..	..	1	..	..	19.2	7.5	1.1	0.0	E. Sharp.
Tunstall	15,500	52	22	11	5	1	..	3	2	3	..	..	..	..	1	..	2	7	..	..	..	43.7	18.5	2.5	5.9	J. P. Edwards.
Ulverston	11,000	30	10	3	1	..	1	1	4	2	..	..	..	..	..	2	..	2	..	..	1	32.1	10.7	2.1	2.1	A. Thompson, M.D.
Walker-on-Tyne	8,000	34	19	6	4	*	3	5	1	2	..	..	..	..	2	..	..	4	..	4	1	50.1	28.0	2.9	5.9	H. J. Hurst.
Wallasey‡	20,000	62	24	*	*	*	*	*	*	3	..	..	1	..	..	1	1	*	*	..	..	32.3	12.5	1.6	*	I. Byerley.
Warrington	40,000	133	56	17	9	5	..	14	11	4	..	1	..	..	..	..	3	5	5	0	7	43.3	18.3	1.3	1.6	G. W. Joseph.
Wednesbury†	26,000	63	37	10	11	2	3	8	3	10	..	..	7	..	2	..	1	2	..	2	..	31.6	18.5	5.0	1.0	J. C. Garman.
West Bromwich†	54,000	166	78	19	13	4	2	17	23	7	..	..	2	..	..	2	3	19	5	2	3	40.1	18.8	1.7	4.6	J. Manley.
West Derby	33,693	96	53	18	5	2	1	17	10	8	..	..	..	..	2	..	6	5	2	..	1	33.5	18.5	2.8	1.7	W. Carter, M.D.
Weston-super-Mare	14,000	35	16	1	3	1	2	5	4	1	..	..	..	..	..	1	..	3	2	..	..	29.4	13.5	0.8	2.5	C. B. Hitchins.
Weymouth	15,269	29	12	1	..	..	..	4	7	1	..	..	..	..	..	..	1	2	1	..	1	22.4	9.3	0.8	1.5	H. Tizard, M.D.
Widnes	22,000	79	32	19	4	1	3	2	3	13	..	..	..	..	..	..	13	7	4	..	..	42.3	17.1	7.0	3.7	W. Cooper.
Willenhall†	19,300	53	23	2	11	2	..	4	4	12	..	1	9	..	2	..	..	1	1	..	..	35.8	15.5	8.1	0.7	W. H. Hartill.
Withington‡	15,000	38	22	6	5	..	..	4	7	3	..	..	2	..	..	..	1	2	1	..	..	26.4	15.3	2.1	1.4	T. C. Railton, M.B.
Wolverhampton‡	76,000	264	138	42	18	7	7	32	32	15	..	..	1	1	5	1	7	22	8	11	25	36.2	18.9	2.1	3.0	J. H. Love.
Workington	10,000	43	16	8	..	..	..	3	5	..	..	..	..	..	..	..	..	4	..	..	..	50.6	18.8	0.0	4.7	J. Ward, M.D.
Worthing	9,540	23	13	2	1	..	1	5	4	..	..	..	..	..	..	..	..	2	1	..	..	28.4	16.0	0.0	2.5	C. Kelly, M.D.
York	46,850	142	73	23	7	4	1	19	19	9	..	..	4	..	..	1	4	9	8	..	5	39.5	18.3	2.3	2.3	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 11.4.

population nearly equal to that of the Metropolis. The deaths from fever, principally enteric, which had been 23 in the preceding month, declined to 7 in July. Small-pox caused 14 more deaths in London, one in Birmingham, and not one in any of the eighteen other large towns. The 14 deaths from small-pox in London showed a decline of 37 from the number in June. The Metropolitan Asylum Hospitals contained 178 patients at the end of July, showing a decline from 216 and 218, the numbers at the end of the two preceding months. The average weekly numbers of new cases of small-pox, which had been 46 and 41 in May and June, declined to 21 during July. Judged by these hospital returns, the fatality of small-pox in London showed a marked decline during July.

The fatality of diseases of the respiratory organs showed a further considerable decline during July. The weekly number of deaths referred to these diseases in London, which had steadily declined in the four preceding months, from 254 in March to 194 in June, further fell to 177 during July, and were equal to an annual rate of 2.5 per 1,000. The death-rate from lung diseases during last month ranged in those of the nineteen large provincial towns for which the information is available, from 1.6 in Plymouth, 1.7 in Portsmouth, 2.1 in Newcastle, and 2.5 in Nottingham, to 4.0 in Liverpool, 4.3 in Sheffield, and 7.3 in Oldham.

In the outer ring of suburban districts around London (having a population of little less than a million persons) the annual death-rate from all causes during July did not exceed 14.4, and the zymotic rate was but 2.8 per 1,000. In inner, or registration London, the corresponding ratio was, as before stated, 21.3 and 5.1 per 1,000 respectively.

In the accompanying table we are able to publish uniform mortality statistics for 188 urban sanitary districts. The number of contributing sanitary districts had, during the preceding twelve months, steadily increased from 36 to 182. On the last day of July, 205 post-cards were sent out to the Medical Officers of Health of as many sanitary districts, of which 17 were new applications. Of these 205 cards, as many as 188 have been returned, and the statistical information thereon furnished is herewith published. The estimated population of the 188 sanitary districts for which we publish statistics for July in the accompanying table is nearly seven and a quarter millions of persons; and if we include London and its outer ring of suburban distrists it amounts to nearly twelve millions. The birth-rate in those districts which furnished this information averaged 34.8 per 1,000, against 38.5, 36.5, and 37.7 in the months of April, May, and June; it was exceptionally low last month in Hurst, Ilfracombe, Bridgnorth, Teignmouth, Bridport, Cheltenham, Rusholme, and Truro. On the other hand, the birth-rate was exceptionally high, and exceeded 50 per 1,000, in Walker-on-Tyne, Morley, Workington, Chiswick, Burton-upon-Trent, Leek, and Mexborough.

The annual death-rate during July averaged 18.7 per 1,000 of the estimated population in the 188 urban sanitary districts, showing a further slight decline from the rates in the four preceding months, which had been 21.8, 21.6, 21.6, and 18.9 respectively. The average death-rate during last month in the twenty larger towns, including London, as before stated, was 20.8 per 1,000; the rate in the smaller urban districts must, therefore, have been considerably lower than that which prevailed in the larger towns. The death-rates during July were remarkably low, and under 10 per 1,000 in Ovenden, Harwich, Bridport, Littlehampton, Teignmouth, Tewkesbury, Truro, Hinckley, Bridgnorth, Ramsey, Rusholme, Bromsgrove, Moss Side, Bromley, Dover, Braintree, and Peterborough. The death-rate was excessive, and exceeded 25 per 1,000 in Preston, Stalybridge, Leek, Altrincham, Burnley, Runcorn, Tamworth, Acton, Walker-on-Tyne, Penzance, and Hyde.

The annual death-rate from the seven principal zymotic diseases in the 188 sanitary districts averaged 3.4 per 1,000, against 2.8 and 2.6 in the two preceding months; the death-rate from these diseases in the twenty large towns averaged 4.5 per 1,000, against 3.0 in each of the two previous months. The increase in the zymotic death-rate was considerably less in the smaller urban sanitary districts than in the twenty larger towns, and was entirely due to the fatal prevalence of diarrhœa. No death from any of the seven principal zymotic diseases was recorded in 37 of the 188 sanitary districts; excluding the twenty large towns previously dealt with; the rate from these diseases showed, however, a proportionally large excess in Glossop, Leigh, Middlesbrough, Widnes, Ilkeston, Colchester, Preston, Willenhall, Brentford, Penzance, Hyde, and Audenshaw. With the exception of the one fatal case of small-pox in Birmingham, already referred to, no death from this disease occurred in any of the 188 sanitary districts. The deaths from measles were proportionally excessive in Hyde, Consett, and Bridgwater. Scarlet fever showed fatal prevalence in Audenshaw, Colchester, Preston, Willenhall, Glossop, Hyde, Wednesbury, and Altrincham. Two deaths were referred to diphtheria in Aston Manor, Barnsley, Batley, and Hyde. Whooping-cough caused 6 deaths in Cambridge and 7 in Middlesbrough. The fatality of fever, principally enteric, was excessive in Bilston, Merthyr Tydfil, Preston, and Tottenham.

The annual death-rate from diarrhœa during July, which averaged 2.4 per 1,000 in the twenty large towns, did not exceed 1.1 per 1,000 in the 169 smaller urban sanitary districts contributing to our table. Diarrhœa fatality, however, showed an excess last month in Acton, Brentford, Chiswick, Ilkeston, Morley, Preston, Runcorn, and Widnes.

The annual death-rate from diseases of the respiratory organs, excluding phthisis, averaged 2.7 per 1,000 persons living in those sanitary districts for which the information is available, against 3.5 and 3.6 in the two preceding months. Excessive death-rates from these diseases, however, prevailed during July in Stalybridge, Redruth, Glossop, Saffron Walden, and Hyde; in the two last-mentioned sanitary districts, the death-rates from lung diseases were equal to 8.0 and 8.4 per 1,000 respectively.

Infant mortality, measured by the proportion of deaths under one year of age to births registered, averaged 159 per 1,000 in those of the 185 urban sanitary districts for which the information is available; the death-rate of infants in the twenty large towns averaged 190 per 1,000, against proportions declining from 148 to 120 in the four preceding months. Infant mortality in London during July was equal to 207 per 1,000, against 109 and 115 in May and June; in the nineteen large provincial towns the proportion last month did not exceed 174. The marked excess of infant mortality in London was mainly due to the greater fatality of infantile diarrhœa. Among the smaller urban sanitary districts infant mortality showed a marked excess last

month in Acton, Burslem, Ilkeston, Widnes, Barrow-in-Furness, Cambridge, Keighley, Cheltenham, Preston, Hyde, and Runcorn.

The table of mortality statistics for July includes the following fifteen watering-places and health-resorts:—Bangor, Brighton, Dawlish, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The annual death-rate in these fifteen watering-places during July did not average more than 16.1 per 1,000 of the estimated population. Excluding Brighton, where infantile diarrhœa showed a remarkable fatality, the zymotic death-rate in these watering-places did not exceed 2.1 per 1,000. These figures afford conclusive evidence of the generally satisfactory sanitary condition of these health and holiday resorts, and of their comparative freedom from zymotic fatality. We may note, however, that diarrhœa fatality was excessive in Penzance, and that the high zymotic death-rate in Torquay was due to the mortality from measles. The death-rate from diseases of the respiratory organs during July, exclusive of Brighton for which this information is not available, did not exceed 1.6 per 1,000, as against 2.7 in the whole of the urban sanitary districts.

We regret that we have only, as yet, succeeded in obtaining the co-operation of the Medical Officers of Health of 16 of the 46 English and Welsh watering places dealt with in the Registrar-General's annual table published at this season of the year. We have reason to believe that the sanitary authorities of a large proportion of these watering places consider themselves unfairly dealt with by the Registrar-General, because that official publishes statistics for the registration districts and sub-districts in which the watering place happens to be situated, instead of those for the precise urban sanitary districts. We can well understand, with reference to Hastings, Dartmouth, Rhyl, and Blackpool (which the Registrar-General reports to have suffered from excessive zymotic death-rates during the quarter ending June last), that the local sanitary authorities would be glad, if possible, to prove that this zymotic fatality occurred outside their jurisdiction. We shall be pleased to afford opportunity for the publication of correct figures for these sanitary districts in our columns, if we are furnished with the information. We, moreover, doubt not that such publication, even for a town like Blackpool, the recent mortality statistics of which have been of a most unsatisfactory character, would forward the best interests of the holiday resort. The public now begin to look for and to expect trustworthy information bearing upon the sanitary condition of a town, before they select it as a health or holiday resort.

The *Bulletin Générale de Thérapeutique* of May 30, contains the following rapid method of analysing milk:—Mix together, in a burette, ten cubic centimètres of alcohol (strength 75 degrees), ten cubic centimètres of milk, to which has been added one drop of caustic soda, and ten cubic centimètres of pure ether. After agitation, the mixture is allowed to stand, when it soon separates into two layers. The lower of these should be carefully drawn off; it contains the caseine, sugar of milk, and salts, which may be separated and estimated in the usual way. The upper layer contains only the butter, to ascertain the weight of which, it is necessary merely to evaporate.

SPECIAL REPORTS.

THE PARKES MUSEUM OF HYGIENE.

THE first public annual meeting of the friends and supporters of this museum was held on Tuesday, July 27, in the Egyptian Hall of the Mansion House, the Right Hon. Sir Francis Wyatt Truscott, Lord Mayor, in the chair. There was a large attendance of distinguished persons.

Amongst the list of letters from well-known and eminent persons read, expressing regret that they were unable to be present on that occasion, and all expressing deep concern in the maintenance of the institution, was one from the president of the Royal Institute of British Architects, Mr. Whichcord, desiring it should be understood that the institute felt the deepest interest in all institutions tending to spread abroad the truths of sanitary science.

Dr. G. V. Poore, Hon. Sec., then read the report of the executive committee, from which we give the following extracts:

'The Parkes Museum was formally opened to the public on the 28th of June 1879, by the Right Hon. Sir Richard Cross, M.P., the Home Secretary, who was accompanied on the occasion by other members of the late government, a large and influential company being present. The Executive Committee are happy to be able to state that the first year of real work so brilliantly inaugurated has been one with which, in many respects, they have a right to feel satisfied. The museum has been open free to the public on three days in each week, and since the 1st of January 1880 the number of visitors, of whom a record has been kept, has been 2,166. During the past winter a series of demonstrations were given on Saturday afternoons by members of the Executive Committee. The first series, by Professor Corfield, Dr. Steele, and the Honorary Secretary, was given for the benefit of the members of the Working Men's Club and Institute Union, and comprised the subjects of House Drainage, Ventilation, Lighting and Warming, Food, and the Management of the Sick-room. The second series, by Professor Corfield and Mr. Rogers Field, was given to members of the Institution of Builders' Foremen and Clerks of Works, and comprised the subjects of Ventilation and House Drainage. Both series were numerously attended. Dr. Ralfe, one of the lecturers on Hygiene appointed by the Society for the Extension of University Education, made application for the admission of his class to the museum, an application which was at once acceded to. Dr. Steele more than once brought a party of nurses from Guy's Hospital and exhibited to them the large collection of apparatus for use in the sick-room which is to be found in the museum. The committee are further informed by Dr. Corfield, the Professor of Hygiene at University College, that the museum has been of great service to him in imparting a practical knowledge of sanitary science to his class. His Cantor Lectures, also, at the Society of Arts, were largely illustrated by articles borrowed from the museum. Thus it will be seen that the institution has been made use of not only by the casual visitor, but also for the purpose of affording systematic instruction to persons who are peculiarly interested in special subjects. The committee wish it to be understood that they will gladly entertain applications from persons engaged in tuition who may wish to bring their pupils to the museum for the purpose of practical instruction. Her Majesty the Queen,

our patron, and a munificent contributor, has been graciously pleased to accept a copy of the first edition of the illustrated catalogue, as has also His Royal Highness Prince Leopold. The Clothworkers' Company have made a second donation of fifty guineas, and the Company of Drapers have given a similar amount, while the Merchant Taylors' Company have given ten guineas. The different sections of the museum have been considerably enriched during the past year. Contributions to the library continue to be made by the various departments of the government which take cognisance of sanitary matters. The National Board of Health of the United States of America has undertaken to furnish the museum with its weekly bulletin, and the President and Council of the Epidemiological Society have presented upwards of 200 volumes of books, some of which are of great interest and value. The sections of Architecture, Engineering, Furnishing, Preservation, and Relief have all steadily increased in size during the past year, the only section of the museum which has shown no tendency to expand being that devoted to Clothing, notwithstanding that the subject in our variable and often trying climate, is one of prime importance. No changes have taken place in the executive staff during the year, excepting the resignation by Dr. Gowers of the post of joint honorary secretary; but as he still retains his seat at the committee, the museum will not be deprived of his valuable advice and aid. The provision of a new home for the museum has already become a necessity, and there can be no doubt that the removal of the collection to a building specially designed for it in some central position would prove a great benefit to the museum and a great boon to the public. As to the financial position of the museum, since the spring of 1876 to the present time £1,285 has been subscribed. Of this, £641 has been expended in museum fittings, in paying the salary of a curator, and in other unavoidable expenditure. £600 has been invested, which yields an income of something less than £24 per annum; and the treasurer has £65 in hand. The museum is free in every respect. No charge is made to visitors at any time. No charge is made for space, suitability being the only condition for the acceptance of any object. Thus it will be seen that the museum is entirely dependent upon voluntary contributions. The Executive Committee are determined that the institution shall remain a true museum, and not become a mere show-room for manufacturers and patentees. To achieve this object, a permanent home for the museum must be found, and a sufficient sum be provided to meet the annual expenditure. The committee for this purpose confidently appeal to the public for the necessary funds.'

The Right Hon. Earl Fortescue then moved,—'That the first annual report, which has been read, affords conclusive evidence that the Parkes Musuem of Hygiene is meeting a great educational want, and is eminently worthy of public support.'

Mr. George Palmer, M.P., in seconding the motion, expressed his gratification in seeing the meeting so largely attended by ladies, for it was unquestionable that the ladies, if acquainted with the laws of health and the principles of sanitary science, could (especially when, as district visitors in connexion with parochial and other organisations, they came much into contact with large masses of the population) do much good in educating the people in the laws of health, and they would be thus greatly facilitating the work of the various sanitary authorities throughout the country.

The President of the Royal College of Surgeons, Mr. Erichsen, F.R.S., in supporting the motion, observed that there was one aspect in which the usefulness of the museum, in aiding in the restoration of health, might be looked upon with great hope of benefit, for the museum was one designed not only for the advantage of the general public, but for the information of managers and surgeons of hospitals and other institutions intended for the cure of disease and the alleviation of physical suffering. It was the undoubted duty of all who had any voice in the management of such institutions to study the laws of health and the appliances whereby health could be preserved to its possessors and restored to those who had—from accident or other causes—been for a time deprived of its blessings, with a view to the application in such institutions of those laws and appliances. If there was one point that had been more incontestably established than another of late years in surgical practice, it was that the recovery of a wounded person was less dependent upon the surgical skill with which he was treated than upon the hygienic conditions by which he was surrounded whilst under treatment. Indeed, the highest surgical skill might be rendered absolutely nugatory by the absence of proper hygienic conditions. It had been shown beyond the possibility of a doubt that in all large establishments for the reception of wounded people—whether they were struck down on the battlefield or were the victims of the numerous accidents which occurred in civil life—that the recovery of the patients was dependent almost entirely upon the hygienic conditions by which they were surrounded subsequently to the receipt of their injuries. There were establishments (happily rare in this country) in which, until within recent periods, it was an exceptional thing for a patient to recover after an amputation; and in one large hospital on the Continent, it was publicly stated six years ago by its surgeon that 80 per cent. of the patients who had undergone surgical operations were killed by pyæmia, gangrene, or some other disease, the result of bad hygienic conditions. It was well known that, given certain favouring conditions, what might be called solely 'hospital diseases' would be generated within the walls of hospitals, but the generation of such diseases was entirely preventable by the adoption of proper sanitary precautions. It was, therefore, the duty of all who had the control and management of hospitals and kindred establishments, to see that the hygienic conditions and sanitary appliances were as perfect as they could be made, for the poor patients themselves had a right to expect that they should not be exposed to danger in the places, above all others, to which they were taken for succour and relief. From the point of view of a surgeon, therefore, he regarded the lessons capable of being taught by and in the Parkes Museum as fraught with incalculable value.

Mr. Erasmus Wilson, F.R.S., also supported the motion at some length, pointing out that such scourges as ringworm were entirely preventable by proper attention to the laws of hygiene.

Sir William Jenner here made some observations, which will be found *in extenso* at p. 47.

Mr. George Godwin said that, assuming for a moment that the public had now arrived at such a state of mind as to see the advantage of healthy homes, they would naturally ask how they were to obtain them, and what they ought to be. These questions would be answered by study of the con-

tents of the Parkes Musuem of Hygiene. And this might be expected to remove some of the ignorance which had existed, and did exist, as shown in the want of ventilation in our houses, want of knowledge of the best means of providing it; the state of the drains, and the execution of the plumbing-work. He had a house in his mind at that moment, a house of £400 a year, wherein the soil-pipe was full of holes, admitting sewer-gas to the rooms, and so placed that this could not be remedied without an amount of destruction that deterred the owner from attempting it. The waste of water, again (see page 58), and of gas, through want of knowledge, was immense. Quite lately, in the small town of Penzance, by simply inspecting and revising some of the details of the taps and other water fittings, 100,000 gallons of water per day had been saved—and that in a portion only of the town—without any diminution in the supply to the inhabitants. It was necessary that the Parkes Museum should have a habitation of its own, centrally situate, and easily accessible by being on the ground floor, and to which every patentee and inventor of sanitary appliances and materials should be invited to lend, if not to give, his productions, and so aid in getting rid of the ignorance which was the mother of disease and death.

Sir Joseph Fayrer, said it was gratifying to see that the principles of sanitary science were now taught in our medical schools and at our universities.

It may, perhaps, be usefully added that the museum is open free on Tuesdays, Thursdays, and Saturdays, from ten to two.

IMPROVEMENT OF ARTISANS' DWELLINGS IN MANCHESTER AND SALFORD.

On the 20th ult. a public meeting was held in the Manchester Town Hall, to receive the report and recommendations of a Committee which, on the 18th of November last, were requested to associate themselves with the Committee of the Manchester and Salford Sanitary Association for the purpose of conferring with the Health Committees of the Corporations of Manchester and Salford with a view to consider the most practicable methods of improving the construction and sanitary arrangements of cottage houses within the two boroughs. The Bishop of Manchester presided.

The following is an extract from the report which bears directly on the labours undertaken by the Committee: 'The Committee venture to direct attention to the state of St. John's parish, as one instance out of many, though not the most populous, and by no means the worst portion of the city, as typical of the condition of too many of the homes of the labouring poor. There are in this parish an immense number of "back-to-back" houses, sadly deficient in ventilation, and in the interests of health and morality far too crowded. There are labyrinths of courts, with narrow-covered entries, containing wretched tumble-down tenements occupied from cellar to garret; dark narrow streets and grimy looking back lanes, into which the sunshine seldom penetrates, in which many of our fellow-men and women live and die, and in which little children pass their earliest days, under conditions of nameless misery. The same condition of things was found in other parts of Manchester and Salford, and, in the opinion of the Committee, there is an absolute necessity for the erection of improved dwellings for the working classes. Self-contained cottages are by far the best abodes for working men, and the Committee recommend the erection of such dwellings, on the most improved principles, in convenient localities beyond the limits of the city boundaries. Within the city, however, where the value of the land renders the building of cottage property unremunerative, the Committee recommend the erection of dwellings on the flat system in some of the most densely crowded centres of the city, the demolition of the least habitable of existing tenements, and the adaptation of the rest to meet the requirements of health and decency. The Committee, after an elaborate and painstaking inquiry into the condition of working men's houses built on the flat system in other parts of the country, especially in London, Glasgow, and Newcastle, believe that such dwellings, built on the most approved methods and with due regard to sanitary laws, would be a great boon to the working classes, give an impetus to their social elevation, and, as a commercial speculation, prove fairly successful. As appendices to the present report, the Committee have given selections from the mass of material now in their hands, and have arranged excerpts from documents, in such a form as to serve as evidence of the following conclusions:—That in several parts of Manchester and Salford the dwellings are unfit for healthy human habitation, and that they are, for the most part, incapable of improvement without reconstruction; that the mortality in these districts is excessive; that the legal powers of the corporate authorities of Manchester and Salford are amply sufficient to enable them to do away with these unhealthy tenements; that there is an urgent necessity for the provision of healthy habitations suitable for artisans and labourers in the neighbourhood of their work; that it is possible to provide such dwellings in the required localities, with a fair prospect of remunerative profit, by rearrangement and remodelling of existing buildings, by voluntary agencies on Miss Octavia Hill's plan, and by building model dwellings in flats similar to those erected in London and elsewhere by the Peabody Trustees and other companies.'

After the report had been read, the following resolution was moved:—'That the report of the Joint Committee be accepted, and that the best thanks of the meeting be given to the Committee of the Manchester and Salford Sanitary Association and the representatives of the public meeting in November for their labour in preparing it.' In moving this resolution, Mr. Dickins said that the working man desired above all things to be as near his work as possible, although they might take him in the cars for almost nothing. It was, therefore, desirable to find central places, and, inasmuch as land was too dear to allow them to provide self-contained houses, they might adopt some plan such as the flat system. In this matter, however, they would have to guard against overcrowding, because if the blocks were built too large there was a danger of epidemics and other evils. He had reason to assert that blocks containing twelve tenements, four on each of the three floors, thus giving two rooms to each tenement, providing proper sanitary arrangements and allowing a small yard at the back, could be erected and would pay a fair interest, say five per cent. at a rent per week of 2s. He believed such structures would not be considered too large. As a means of carrying this out, he ventured to recommend the adoption of the principle embodied in the coffee tavern companies. For the purpose of erecting such a block as he had described, they might form a company with a capital of £20,000, the un-

derstanding being that the company was to pay, and they might begin with one block, show that it was doing well, and then begin other blocks as they were required. He could not doubt that the Corporations would facilitate such an object by helping them to obtain land and giving them such advice and assistance as they could. He did not think they could expect Corporations to provide such buildings; he did not think they should look to the trade; but a practical and not unremunerative benevolence might lead the way, and in time it might be left to individuals further to develop the plan. With regard to the cost, such a block of buildings as he had described, containing twenty-four rooms, and with suitable arrangements, might, he estimated, be erected at a cost of £800. He took the ground rent of the 200 yards to be 6d. a yard, and he allowed for rates, repairs, etc. He said they were erecting in Salford at that moment a large hospital, which was expected to be second to none in the kingdom, at a cost of 30s. per yard, and the Local Government Board was so astonished that the Guardians had been asked to explain how they had arranged to do the thing. It was simply by combining economy with efficiency. The building would be a handsome building, and would cost about £54,000. There were two or three such buildings at the present moment being erected in different parts of the country, one or two of which cost 50 per cent. more.

The resolution was then put to the meeting and carried.

Mr. Chadwick next moved, 'That it is desirable to form a limited company for the purpose of building improved dwellings near the great centres of labour in Manchester and Salford, and that the following gentlemen be requested to sign the Memorandum of Association:—Dr. Noble, Dr. Ransome, Dr. Sutton, Mr. R. Longden, Mr. T. Dickins, Mr. T. C. Horsfall, Mr. E. W. Nix, Mr. L. W. Andrews, and Mr. John Newton.' Mr. Chadwick said he could see no possible objection to the flat system. He looked upon the undertaking as being to some extent an experiment, though he believed the buildings they proposed to erect would pay commercially, and that satisfactory accommodation would be provided at rents below what they were now compelled to pay when they had houses in town. Mr. Goldschmidt, Deputy Chairman of the Health Committee, said that the discussion had been characterised by a good deal of exaggeration. In this city cellar dwellings had been closed, not in hundreds, but in thousands. He believed there were only about eighty remaining, and those were inhabited chiefly by old women who had lived in them for years, and who, if they were turned out, would have no other refuge but the workhouse. With regard to Mr. Dickins's figures he could not dispute that the blocks might be erected for £800; but he believed no land in Manchester could be got for sixpence per yard—two shillings would be much nearer the mark. Mr. Dickins calculated that the shareholders would have 5 per cent. on their outlay, but if that gentleman would guarantee him even 4 per cent. he would let him have as much money as he pleased. The fact was Manchester working people would not live in flats, and there were at the present time so many empty houses in the city that working people could get them almost as cheap as houses in flats. Mr. Chadwick's motion was afterwards put to the meeting and carried, as was also one to the effect, 'That the Corporations of Manchester and Salford be earnestly requested to put in force more fully the ample legal powers they possess for the demolition of dwellings unfit for human habitation, and for the alteration of dwellings requiring it, with a view to improving the present unsatisfactory conditions in which large numbers of the working classes live.'

THE SALE OF MILK IN THE WEST OF ENGLAND.

A DEPUTATION from the Bristol and West of England Dairymen's and Milk Sellers' Association has recently waited upon the Mayor of Bristol, to ask him for the strict enforcement of the existing regulations with regard to the sale of milk.

Mr. Wansbrough, solicitor to the association, said there were certain orders in Privy Council after the passing of the Contagious Diseases (Animals) Act, 1878 (see SANITARY RECORD, vol. x), and the idea of the present deputation was that those orders had hardly been complied with, and they desired to explain their wishes with regard to the matter. The association was formed in July 1879. Their object was simply this. Throughout the kingdom certain Acts were in operation for securing the supply of pure milk, and the association—which was not a trade association only—knowing that pure milk could not be supplied under a certain price, and wishing pure milk to be supplied, wished the provisions of the order referred to to be fully carried out.

Mr. H. W. Case, treasurer to the association, said there had been reported from time to time in the last few years cases of outbreaks of various diseases attributed to impure milk. Bad impressions were created in the public mind. They had appeared to imagine that because one farmer or cow-keeper sold contaminated milk that the whole town's supply must be bad. Their confidence was shaken and they at once limited their requirements, and in many cases stopped the supply. To the dairyman who had daily an average quantity, or the farmer who supplied him, this frequently meant almost total loss, as the surplus was not readily convertible to other uses. Milk was an article of a very perishable nature, and the ordinary losses were at times considerable, to say nothing of those losses which they had in common with every trade. Besides the especial hardships of a dairyman's life in enduring every vicissitude of weather and long hours at the extreme parts of the day, in the pursuit of what was at least a precarious calling, he had to submit to a system of surveillance to which no other trade was exposed; they begged, therefore, with full respect, to ask that they might reap to the full the benefits which the law, in the new 'Cowshed and Dairies Act, 1879', if properly carried out, would give. Many medical and other scientific authorities had advocated a strict and general supervision of every farm, dairy, and place where milk was sold from, throughout the kingdom. In support of this the speaker quoted the opinions of Mr. Davies, Medical Officer of Health for Bristol; Mr. Ernest Hart, editor of the SANITARY RECORD, and chairman of the National Health Society; Dr. Andrew Buchanan, and others. The construction of cowsheds was intimately connected with this subject. Cows in full milk were very susceptible of chill and cold at low conditions of temperature. Some cows which had been milked from an early age, before they were matured, or which were from other causes not of a robust constitution, would suddenly shrink a large quantity of milk on a cold day or night; to obviate these losses many milk farmers constructed their sheds in such a way that the animals might help keep each other warm, little regard

being had for ventilation and other sanitary arrangements. Because the animals, like some human beings, appeared to live for a long time, as a whole, without seriously impaired health in their unhealthy surroundings, it had become almost a moot point with many practical men as to whether a light, airy, and well-ventilated shed was as well for the production of milk and the thriving of the cow as the old-fashioned close shed. Some of the unwholesome dens in and around cities where cows were kept were beyond notice. Taking a common-sense view of the case, it would seem that the ammonia and other animal excreta and exhalations which cause blindness, short-wind, and other unthrifty conditions of the horse must have a prejudicial effect on neat cattle. The heat of the bodies and of the breath together (the atmosphere being charged with carbonic-acid) in a cow-house where a large number of animals are kept often makes the labourers as well as the animals in a profuse perspiration. Cow-keepers who have tried the system of light and airy commodious sheds with efficient ventilation, guarding carefully against all draught, short stalls, bricks laid in cement or concrete, shallow gutters, with frequent attention, water troughs, and clothing for the animals, with occasional grooming, have remedies against the majority of ills which cow-flesh was heir to.

Mr. Wansbrough said the authorities had various powers. Large powers were given under the Contagious Diseases (Animals) Act, 1878. He thought they had powers for making such orders as might be deemed necessary for the purpose of this Act being carried out. All the people who sold milk had to be registered. The deputation complained that they were not so registered. Places existed where they stored milk and cans side by side with other objectionable things. The milk was liable to be contaminated thereby. Mr. Wansbrough asked that the law now set, in many respects, at defiance, might be fully enforced.

The Mayor asked whether offensive germs could not be detected by analysis.

Mr. Wansbrough said that they might be discovered on close analysis if particularly looked for.

It was then agreed that Mr. Wansbrough should furnish the Mayor with a list, showing in what respects the present law was not carried out.

SEWAGE PRECIPITATION WORKS AT AYLESBURY.

On the 26th ult. a considerable number of members of Parliament, scientific men, and others, met at the A B C sewage works at Aylesbury in order to inspect the improved process carried out there on the patent of Messrs. Sillar. The whole of the town sewage runs by gravitation to these works, contributing about 300,000 gallons daily from a population of some 8,500 inhabitants. The sewage, directly it enters the company's premises, receives an admixture of clay and charcoal, and, immediately afterwards, a solution of silicate of alumina, which is made by treating shale with sulphuric acid. Almost as soon as these ingredients are added to the raw sewage the solids begin to be separated from the water and curdle in readiness to deposit themselves. The sewage in this state is led to the furthermost of three large tanks, where the solids are mostly precipitated, and the escaping water is then taken to the second and third, where, by that time, the whole of the sewage matter is deposited. In order to further clear and also aërate the effluent water, the latter is led in a stream again along the length of the tanks, and by the time this journey has been performed it is perfectly clear and sufficiently pure to sustain both animal and vegetable life, in proof of which a pond of this purified water, with fish in it over three pounds weight, is open to inspection.

When the solids have been deposited in the tanks the latter are emptied weekly by being pumped up into a large tank situated above suitable presses in an adjoining shed. From this tank the sewage or sludge falls by gravitation into the presses, where the bulk of the moisture is removed, and which, by the way, is taken back under ground to the sewer again. With these presses steam pressure is also used, by which means the sludge is robbed of nearly the whole of its watery particles; these cakes are finally removed to a drying shed in the town, where they are further dried and powdered down for use. During the whole of the process—even when in the neighbourhood of the tanks and presses—not the slightest odour is discernible, so perfect is the peculiar action of the added matters.

The works at Aylesbury produce from the quantity of sewage mentioned above about ten tons per week of this native guano, which readily finds a sale at £3 10s. per ton. It is at present mostly sent abroad, being in great demand as an antidote against the ravages of the phylloxera in the vineyards. It has, however, been also much approved of for home use, and it is computed that its economic value is about one-fifth of that of Peruvian guano. The quantity usually put upon the land is 14 cwt. per acre, or thereabouts. According to analysis made, the effluent is remarkably pure, and there can be no doubt that the whole of the fertilising matters in the sewage has been intercepted. The standard demanded by the Rivers Pollution Commission fixes the limit of the principal impurity, viz., albuminoid ammonia, at 0.21 grains per gallon, or 3.00 parts per million; but the Aylesbury effluent contains only 0.30 parts per million, or ten times less than is allowed.

This improved A B C process ranks above other precipitation systems in regard to the striking purity of the effluent water. The lime process in use at Burnley retains nearly 30 per cent. of albuminoid ammonia per 100,000, and, at Birmingham, the amount of this impurity retained is nearly doubled; moreover, with the lime process, there is a good deal of effluvium which is entirely absent in the A B C process. There can be no doubt that the system under review is well adapted for use in towns where irrigation is impossible or the soil unsuitable; and, if the added ingredients are easy of access, viz., the clay, and the silicate, etc., the process can be made fairly remunerative with the aid of a small subsidy from the authorities, or, perhaps, without such aid. The cost of erecting works to carry out the plan would be about £1 per head of the population. At Aylesbury, the engine power required is only eighteen horse-power.

We are informed that Mr. G. B. Nichols, C.E., who laid the King's Norton sewers and had got out the plans for the drainage of the large district comprising Gravelley Hill, Erdington, Sutton Coldfield, and other places, for the Aston Authority, has been replaced by Mr. E. Pritchard, C.E., Past President of the Association of Sanitary Engineers, and the scheme which report says was originally intended to cost something like £100,000, is likely to be very considerably reduced.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BARTON URBAN.—Dr. Benjamin Carrington's report upon this growing suburb of Manchester is for the two years 1878 and 1879. He has on the whole a fairly satisfactory state of things to record, though there is yet much to be done in the district. In an estimated population of 22,800, there were in 1878 776 births, and in 1879, 793. The deaths for the same periods were 443 and 457, equal to rates of 19.4 and 20 per 1,000 respectively. The mortality among children is still excessive, though lower than in some previous years. In 1876 these deaths constituted 50 per cent. of the total mortality; in 1877, 40 per cent.; in 1878, 44.2 per cent.; and in 1879, 43.8 per cent. Dr. Carrington makes an urgent appeal to the ladies of the district to give instruction to poor mothers in the management and feeding of their chiidren, and he advocates strongly the establishment of a crèche. One established not far off, at Patricroft, has proved a great success. The district has, during the period under report, been comparatively free from zymotic diseases. In 1878 there were 15 deaths from scarlatina, 9 from measles, and 7 from enteric fever. In 1879 there were 3 deaths from scarlatina, 2 from measles, and 3 from entèric fever. The mortality from diseases of the respiratory organs is a heavy item in the mortality returns. The speculative builders seem to be seizing upon the district as a field for their operations.

BINGHAM RURAL.—Mr. Poyntz Wright has a year of little sanitary moment to record for his district. The general death-rate was 18.07, and that from zymotic diseases 1.47 per 1,000. Scarlatina was present in four villages, in one of which a case of small-pox imported from France also happened. Diphtheria caused a death in each of three villages, and typhoid fever in one of each of two others. Mr. Wright has some useful remarks on the subject of the drainage, water-supply, and meteorology of his district, and adverts to the difficulties under which health officers suffer through not receiving early information of the existence of infectious disease. He instances a case in which the mother of two children ill of scarlet fever had remarked to a neighbour, 'We must keep this quiet, or we shall have the health officer poking his nose in'—the result of this policy being that the officer never learned the truth for three weeks after.

BOLTON.—The report on this district is for the year ended the 30th September, a faulty and unnecessary arrangement, upon which we have often had to comment adversely. We are sorry to find that for so important a town as Bolton it is still impossible, on account of this method of report-making, to satisfactorily compare the vital statistics with those of neighbouring towns. In other respects there is nothing to object to in the report, which betokens much careful work on the part of Mr. Sergeant. During the twelve months ended the 30th September, 1879, there were 3,897 births and 2,233 deaths registered in the district, equal to rates of 37.0 and 21.2 per 1,000 respectively. The rate of mortality shows a slight decrease of 0.8 per 1,000 as compared with 1878, and was less by 3.8 per 1,000 than the average of the past ten years. The infantile mortality was satisfactory in comparison with the high death-rates amongst children that used to rule at Bolton. The proportion of deaths of children under five years of age was equal to 42.85 per cent. of the entire mortality and 24.5 per cent. of the total births. Zymotic diseases were credited with fewer deaths than in any year yet recorded, a result ascribed by Mr. Sergeant in large measure to the early information of infectious cases, which is compulsory in the town under the local Act of 1877. The only zymotic disease that was unduly prevalent was whooping-cough, which caused in all 97 deaths. In referring to the fever deaths, Mr. Sergeant adverts to the dangers arising to health from imperfect house drains, and gives certain plates, after the manner of Mr. Pridgin Teale, to show these dangers graphically. Now that the Local Act providing for the notification of infectious cases has been amended, it seems to be working smoothly and well.

GLANFORD BRIGG RURAL.—Appended to this report is a statement of the sanitary improvement effected in each village of the district since 1874. This taking stock, as it were, of what has been done and what remains to do, is a useful feature which might well be followed in other districts. The *resumé* shows that a good deal of real work has been done under the guidance of Dr. Moxon; but there can be no doubt that were it not for the systematic supervision exercised over the sanitary condition of the district, it would soon relapse into its old unsatisfactory condition. The improvement effected has been mainly in the repression of nuisances, structural works being rendered almost impossible by the 'bad times'. The total number of deaths during the year was 414, the lowest number since 1874. From an annual death-rate of 19 per 1,000 in 1874, the district has reached a rate of 14.22 for 1879. This very satisfactory result may fairly be attributed to the improvements effected in the district since the appointment of the Medical Officer of Health. Last year was free from any general outbreak of fatal infectious disease. Measles, scarlet fever, whooping-cough, and diphtheria occurred in several parishes to a small extent, and typhoid fever caused the death of two persons.

HENDON.—London suburbs have hitherto been distinguished for the laxity of their sanitary administration, and Hendon seems to be no exception to the rule. Dr. Cameron, reporting to the newly-formed Local Board on the six months of 1879 during which he held office, adverts to the unsatisfactory nature of the drainage, and to the need for improvement in the water supply. He tells us of numerous cases of infectious disease associated with one or another sanitary defect, and generally leaves upon the mind the impression that the parish is in an unsatisfactory sanitary state. A systematic and house-to-house inspection of the whole district would seem to be a step imperatively required for a proper beginning of regular sanitary work here. The statistics for the six months show an annual death-rate of 16.6 per 1,000 on an estimated population of 8,993. From zymotic diseases 10 deaths occurred: 2 from scarlet fever, 1 from typhoid, and 7 from diarrhœa. A large number of non-fatal cases of the two former diseases receive, however, consideration in the report.

KINGSTON-ON-HULL.—The particulars of sanitary work given by Mr. Holden in this report are very full and precise, but it would have been an advantage had the circumstances of the occurrence of infectious disease in the district been considered at greater length. The question of providing pumping stations for the relief of the drainage, so as to prevent the stagnation of sewage in the numerous sewers that cannot be flushed, is one that needs the early

attention of the Town Council. Doubtless such stations would be expensive, but every year fresh houses are being drained into the sewers (a thousand were erected last year), and thus add to the danger. The destruction of offensive refuse is now in a forward stage of consideration by the Council, and the erection of a destructor seems an urgent sanitary necessity. The staff of nuisance inspectors has been considerably increased, with very satisfactory results. The night-soil removal has been materially improved, but it is difficult to find suitable sites for depôts, which must be situated where there are facilities for shipment by water or rail. During last year there were 5,779 births and 3,235 deaths in the borough, equal to rates of 39.5 and 22.0 per 1,000. The total number of deaths from zymotic diseases was 329, or one-tenth of the entire number of deaths, against 589 in 1878 and 418 in 1877. The decrease both in the mortality from zymotic disease and amongst children is mainly due to the absence last year of infantile diarrhœa, which prevailed so fatally in 1878.

LEICESTER.—It is difficult to do justice in a few lines to a report so full of interest as this. The subjects of infant mortality, and of the annual prevalence of diarrhœa, are in especial so ably treated in it as to deserve very extended perusal. Our readers will, from Dr. Johnston's paper on page 43 of the last volume of this Journal, be acquainted with his views as to the causation of the puzzling mortality from diarrhœa that annually occurs at Leicester; and it will be sufficient to say that in his opinion last year's diarrhœa figures add further weight to his belief that 'diarrhœa, as it affects both adults and infants during the summer months, depends in the majority of instances upon the introduction into the system by means of air, or in food, of living organic ferments derived from the putrefactive decomposition of animal refuse matter.' To much the same cause, coupled with the ignorance of neglect of mothers in the rearing of children, he ascribes the terribly high infantile mortality of the town. In referring to the mortality from scarlatina, which was the most fatal zymotic disease of the year, Dr. Johnston shows most clearly the invaluable assistance afforded in the stamping out of the epidemic by the new powers, which came into force in the height of the outbreak, for requiring compulsory notification of infectious disease. The increasing appreciation of the Fever Hospital is a satisfactory feature of the report. The general death-rate of the year was 21.1 per 1,000, a slight excess on that for 1878, but less by 3.5 per 1,000 than the average rate for the nine years 1870-78. A word of praise must be given for the unusually handsome manner in which the report is got up and illustrated.

PEMBROKE RURAL.—This report shows Mr. Saer to be working energetically and courageously against very great difficulties in the shape of indifference on the part of the Local Authority. On these grounds, as well as on that of its own intrinsic merits, this is a report of a kind that eminently deserves to be encouraged. All the conditions likely to affect the mortality statistics of the district are referred to in the report, and a long series of tables, which must have taken much trouble to prepare, is also included. During 1879 there were 305 births and 178 deaths in the district, equal to rates of 25.3 and 14.8 per thousand of the estimated population. Phthisis was the most fatal disease of the year, causing more than a sixth of the total deaths. Thirteen deaths were due to zymotic diseases—three of these being from typhoid fever and nine from diphtheria. The latter disease was present in an epidemic form at Jameston in connection with conditions of great filth and sanitary neglect. Of 122 people living in the village, 14 were attacked and 7 died. Mr. Saer's investigations into the cause of the outbreak—on which he reports in much painstaking detail—lead him to the belief that 'the specific sporadia of diphtheria was generated by the insanitary state of the school and its buildings and the villages, and the latent poisoning was excited into activity by the severe weather.'

ST. FAITH'S RURAL.—An unsatisfactory feature in this report is the high infantile mortality. The proportion of deaths of children under one year of age was 155 per 1,000 births; a result ascribed by Dr. Shepherd Taylor partly to the increasing scarcity of the natural food of infants through the decreasing amount of dairy-farming now pursued in Norfolk. In the absence of milk, parents give their children farinaceous food of some kind or other, which their stomachs can only imperfectly digest. Dr. Taylor has no doubt that marasmus (which is the most fatal infantile disease in the district) is in many instances thus brought about. The general death-rate for 1879 was 17 per 1,000, but whether or not this is an improvement is not stated. The average duration of life was about 38 years for the entire district; and one labourer died aged 97. Scarlatina was the most fatal zymotic disease of the year. It was chiefly prevalent at Felthorpe, where 6 deaths occurred from it. Three other deaths from it occurred in other parishes, and in the whole district there were 2 deaths from whooping-cough, 2 from diarrhœa, and 1 each from typhoid fever and diphtheria. It is encouraging to learn that certain of the landowners of the district are interesting themselves in sanitary matters and making material improvements in their cottage property.

SUNDERLAND.—Dr. Yeld's report chronicles a satisfactory amount of sanitary work in all departments. The general sanitary condition of the borough has evidently been systematically and carefully attended to during the year, more especially the drainage and sewerage of new streets and houses. A most desirable improvement is being effected in the abolition of the old system of ashpits in favour of pail closets. The total number of ashpits and pail closets now in the town is estimated at some 13,000, from which, during last year, 35,259 tons of refuse were removed and disposed of. The regulation of the dairies of the town, under the Act of 1878, seems to be efficient, and the slaughter-houses and common lodging-houses are reported as in good order. Considerable pogress has been made with the sewerage of the town, and a large sum has been borrowed for carrying out the very necessary work of paving and flagging the public thoroughfares. The health of the borough is improving. Last year the death-rate was 21.8 per 1,000, a decline of 3.7 per 1,000 as compared with 1878. The infantile mortality, though still high (44 per cent. of the total deaths), was the lowest on record. The chief zymotic disease of the year was scarlatina, which was fatal in 243 cases, 157 of these being in children under 5 years of age.

THINGOE RURAL.—Dr. Kilner's report evidences careful work, though it is perhaps not recorded in the best way. During the year 1879 there were 474 births and 291 deaths in this rural district, equal to rates of 28.2 and 16.5 per 1,000 respectively. The calculation of rates (necessarily on very small figures) for each separate parish is very fallacious, and may give rise to much misapprehension. Thus, the death-

rate of Bradfield Combust is given as 36.1, whereas, on turning to the tables at the end of the report, we find that altogether there were 6 deaths (all of females) in the parish during the year, 4 being above the age of 60 years. Obviously any inferences drawn from a death-rate thus calculated must needs be erroneous. Measles seems to have been generally prevalent during the year, and by far too many cases of typhoid fever are reported. Would Dr. Kilner give special attention in future to the causation of these sporadic cases, with the view of determining, if possible, the infecting agency? The water supply of the district seems to be almost wholly from impure surface wells and ponds, but this impurity is not usually regarded as sufficient to cause enteric fever, unless the specific infection of that disease has had access to the water.

TOTTENHAM.—In view of the enormous increase of building operations here, and the large number of cases in which 'jerry builders' have had to be proceeded against, it is to be regretted that the Local Board of this growing suburb have not yet adopted the model by-laws of the Local Government Board, which would give them power to punish such builders much more effectually than at present. Perhaps no district is so much cursed as the north of London with jerry builders, who, in the absence of any efficient control over their malpractices, sow broadcast the seeds of sanitary mischief, which can afterwards be only rooted out with the utmost difficulty. An idea of the rapid development of this neighbourhood may be gathered from the fact that in the last five years plans have been presented and approved by the Local Board for about 15,500 houses, which, when occupied, will bring the population of the once rural village of Tottenham to the enormous total of 140,000. The total length of new roads represents 18 miles, and of sewers and surface drains 32 miles. With figures like these to deal with, the sanitary government of the place needs to be of the most efficient kind, and we confess we should have liked more detailed information on this point than is given in Dr. Tyndale Watson's report. Many sanitary improvements, such as the cleansing of brooks and ditches, the construction of storm outlet culverts, a considerable amount of kerbing and paving, additional ventilation of the sewers, and the erection of a mortuary, have indeed been carried out; but the authority need to be constantly on the alert to prevent new evils from growing up around them. The fact that twelve deaths from enteric fever occurred in the district last year shows, we think, that the sanitary deficiencies of the district are far from being overtaken. The general death-rate is calculated at 17.6, about the same as in 1878. Scarlatina caused 15 deaths (against 28 in 1878), and whooping-cough 22 deaths (3 more than in 1878). Pulmonary diseases caused 153 deaths in the year, as against 104 in 1878. The water supplied to the district continues to be highly satisfactory.

WITHINGTON.—Dr. Railton calculates the death-rate of this suburb of Manchester as 13.5, on an estimated population of 15,000, but he does not tell us how he arrives at this estimate, and it is not possible, therefore, to check his figures, which give a rate extremely small for such a district. The infantile mortality shows a marked improvement in comparison with the three previous years. In 1876 and 1877 the proportion was a little more than a third of the total mortality; in 1878 it was a little less than a third; and in 1879 it was not much more than one-fourth. Of the zymotic diseases, measles caused 3 deaths, scarlatina 4, whooping-cough 5, and enteric fever 1. Some very interesting particulars are given as to the circumstances under which scarlatina was present in the district. The disease appeared in some 31 houses, and 58 cases of it occurred. It was mostly spread by personal contagion, but certain of the cases were connected with a particular milk supply. One group of cases was remarkable. The coachman of a gentleman, who was in the daily habit of sitting by his side in an open carriage as he drove to town, had four of his children down with scarlatina; he gave the infection to his master, who contracted the disease, and four other members of his family suffered from it also. A great step in the right direction has been taken in the decision of the Sanitary Committee to issue plans and specifications of the work which they call upon owners to execute.

REVIEW.

Observations on the Construction of Healthy Dwellings; namely, Houses, Hospitals, Barracks, Asylums, etc. By DOUGLAS GALTON, C.B., F.R.S., late R.E., etc., etc. Clarendon Press series.

This work is an expansion of a valuable series of lectures, delivered by the author at the School of Military Engineering at Chatham. As he states in his preface, there is necessarily little that is new in the work, but all the available sources of information have been freely laid under contribution, as may be seen from the list of authorities cited. Chapter I is preliminary; while chapters II and III treat of the question of site, giving a good *résumé* of the recognised facts, and some useful illustrations. Chapter IV treats of the conditions which regulate the healthy arrangements of dwellings in a given area; chapter V of purity of air in an occupied building. Both this, and the questions of cubic and floor space in chapter VI, are well and succinctly treated. The movement of air, and simple ventilation, occupy the next chapters; while chapters X to XII consider the question of ventilation in combination with warming. Chapters XIII and XIV are taken up with the arrangements of buildings, their materials, and their structural details. All these chapters are well done, containing much valuable information in a clear and concise form, well illustrated with woodcuts. The remainder of the book is occupied with the question of purity of water, removal of refuse, drainage, sewerage, and sewage disposal. The chapter on drains in a dwelling is one that cannot be too strongly recommended to architects, builders, landlords, and tenants; in short, to the community at large. Were the instructions therein contained followed, we should hear much less of diphtheria, enteric fever, and many other death-dealing disorders that desolate homes, and bring the survivors to misery and want. As the author says, in conclusion: 'The remedy for these evils would be comparatively easy, if each member of the community were induced to perform his part in their prevention or removal. In order to attain this end, every member of the community should be taught the principles of sanitary knowledge. When this has been done, and when the co-operation of every individual in a community has been enlisted, to aid in enforcing attention to sanitary details, we may hope for practical progress in the diminution of preventible disease, and for a general improvement in the health, and therefore in the happiness, as well as in the wealth-producing power, of the community.' We think the Oxford authorities have done well in including this useful work in the Clarendon Press series.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF COMMONS.

(*July* 16.)

Noxious Vapours.

Viscount Midleton called attention to the report of the Royal Commission on Noxious Vapours, and inquired whether the Government proposed to introduce a measure in accordance with the recommendations contained in it. The noble lord having referred to the appointment of the Commission in 1876, stated that it presented its report in 1878, and a Bill was founded on it, but it perished in what was termed the massacre of the innocents of that year. Meanwhile, the evil went on in the manufacturing districts, and so bad became the air from the noxious vapours that even the telegraph wires became corroded. There were, in fact, seven great centres of manufacturing industry in which these noxious vapours were generated, extending in the north from Glasgow to Cheshire, and in the south from Swansea to Gloucester, and also all along the Essex shore. The Commissioners, of whom he was one, visited the whole of the districts which were the scene of the generation of noxious vapours, and inhaled at the fountain head those fragrant gases which proved so destructive alike to life and vegetation. Since the subject was first brought before their lordships' notice, the various works had increased threefold, but wherever a proper pressure had been put on, those engaged in the manufacture had, by the aid of science, found a way to neutralise the deleterious gases which were generated. Various categories were framed by the Commission, by which the more deleterious works should be classified, and only carried on under rigid inspection. There were some manufacturers who objected to all inspection, and he did not wonder at it; others objected to any inspection that was not of a local character; and in compliance with their suggestions, the Commission recommended a joint action between the general and local board, and that they should be placed under the control of the local board inspectors. Of course, where there was a circle of works it was impossible to apportion the injury done by the noxious gases to the surrounding land, but had the Bill recommended by the Commissioners introduced this year been passed, great good would have resulted; but unfortunately a change of Government took place, and it could not be proceeded with. He pointed out that in the vicinity of the metropolis, when the wind set in a southerly direction, all the deleterious gases from the factories on the river were blown across it, and spread over the otherwise healthy district, to the great injury of the locality. He did not suppose that a Bill could be carried this session, but he asked for an assurance that the Government would at an early period grapple with the evil. He had only one object in view, and that was to mitigate the evil caused by the manufactories, and he found that it could be reduced to a minimum. He thought the best practical course would be to make use of the discoveries that had been made to neutralise the gases and put an end to the evil.

Viscount Enfield thought that the noble lord had not exaggerated the evils or the general importance of the subject. What the Commission recommended was an extension of the Alkali Act, and some improvement in the summary procedure under that Act with regard to penalties and damages, and also that certain works not now included in those Acts should be subject to inspection annually. He assured the noble viscount and their lordships that the President of the Local Government Board was deeply impressed with the importance of the question, and without giving a distinct pledge he would, if possible, introduce early next session some measure to carry out the recommendations of the Royal Commission.

(*July* 28.)

'Saccharum'.

Mr. Hicks asked the Chancellor of the Exchequer whether he was aware that a substance called 'saccharum', or condensed maize wort, had been manufactured and used by common brewers as a substitute not only for malt, but also for sugar; and whether he contemplated the use, under the Customs and Inland Revenue Bill, of such a substance in brewing what was to be called 'beer'.

Mr. Gladstone said he had not heard until this question was put of the use of the substance, but, undoubtedly, with the exception of the limitation to which reference had been made with regard to things in themselves mischevious, the Bill did not contemplate any limitation whatever on the use of materials which might be thought useful by parties in the production of beer. There would be no limitation on the use of this substance, and he believed it would be charged technically under the name of 'sugar'.

(*August* 2.)

Enteric Fever in Glasgow.

Mr. Middleton asked the Vice-President of the Council if his attention had been called to an alarming outbreak of enteric fever which occurred in Glasgow in April of this year: if he is aware that the medical officer of health in his report to the authorities traces the cause of the epidemic to milk supplied from a farm in the neighbouring county; if he has inquired at the Local Authority in that county if 'the Dairies, Cowsheds, and Milkshops Order of July, 1879,' under 'Contagious Diseases (Animals) Act, 1878,' has been carried out; more particularly was the farm registered; was it inspected by the officers of the Local Authority; have the authorities issued regulations under the Order in Council; and if so, the date; and whether, in view of the repeated outbreaks of fever traced to milk, the Government will take into consideration the propriety of introducing an Act for the sanitary regulation of places of milk-supply to towns.

Mr. Mundella, who was heard imperfectly, said his attention had been drawn to this outbreak of enteric fever by a report which emanated from the medical officer. The outbreak was stated to have been traced to milk supplied from a farm in Stirlingshire, which farm had been registered and inspected. Immediately on being informed of the report of Dr. Russell and the result of the inquiry by the Local Authorities, the necessary orders were issued forbidding the sale of the milk. The water supply of the farm was found to be defective, and was ordered to be changed. The farm had now a good supply of water, and there was no reason to suppose that it would be the occasion of any further spread of disease. The restriction had not, however, yet been removed, and the Veterinary Department were of opinion that every precaution had been taken by the Local Authorities, who had acted with great promptitude and intelligence, and there was no occasion for further rules and regulations.

Mr. Henry Robinson, M. Inst. C.E., has been appointed Professor of Land Surveying and Levelling at King's College, London.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

RATS AND LEAD-PIPES.

In a paper which I read at the Croydon Congress of the Sanitary Institute, which was held last year, I alluded to some specimens of lead which I possessed, and which bore traces of attacks from rats and worms. The statement has received some attention, judging from correspondence which I have received, and I desire therefore to state the exact facts.

Specimen No. 1.—*Waste pipe eaten by rats.*—This is now before me, and is a piece of a two-inch lead

pipe, a quarter of an inch in thickness. It formed part of the waste-pipe of a sink in a house at Tulse Hill, near London, which waste-pipe went direct into an old brick drain, infested with rats. The rats obtained ingress to the house by way of this pipe, that is certain; and on taking up the floor some hundreds of these animals were destroyed, and many missing articles recovered. The marks of their teeth are very plainly exhibited, as may be seen by a glance at the woodcut here given, which does not exaggerate them in any way.

Dr. Lory Marsh, at the same meeting, fully endorsed what I said, and mentioned two instances in confirmation, one where rats had gnawed a hole into a waste-pipe and formed a highway into the house for the sewer air, and another where the rats had eaten the supply-pipe which brought water to the kitchen boiler. I have other corroboration as well.

I may incidentally mention here, that in a similar way mice have been known to attack the composition pipes which are laid between joists as gas piping. Their object was evidently to get at the water which sometimes rests in badly laid pipes.

Specimen No. 2.—*Lead flashing eaten by worms?*—This was taken from the roof of an infirmary in the

North of England, at which I was engaged two or three years ago. The wood-work below had been first of all destroyed by the wood borers, and the light shaded marks on the accompanying (full size) cut show where the acid of the destroyed wood had only partially destroyed the lead. The white holes are actual perforations to the open air.

A similar example of worm-destroyed wood being followed by perforations in the overlying lead, was shown to me at a house in Leicestershire, and was then being kept as a curiosity. Coming across, also, on one occasion a few years ago, similar perforations in the flashings of a house in a London square, I took them, at first, for wilful borings, mischievously done to spite the contractor, and I offered a reward to any one who would satisfy me as to this. I have no doubt many of your readers could relate similar experiences as to encountering lead perforated in this way.

W. EASSIE.

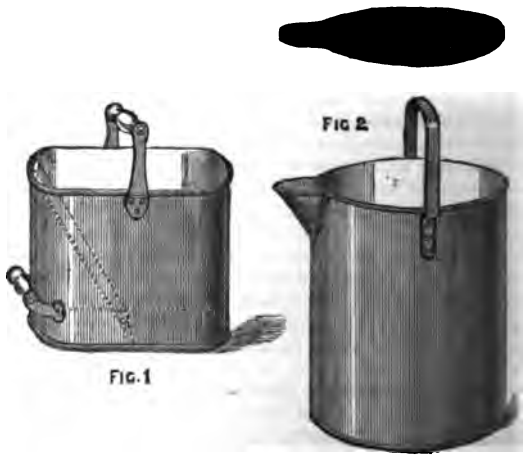
11, Argyle Street, London, W., Aug. 2.

WASTE OF WATER.

Sir,—I have forwarded to you for your inspection a box containing two cans, the larger one for the use of cottage tenants who obtain their water-supply from stand pipes, the smaller one for flushing all water-closets constructed on the principle of having the common water trap attached to the foot of the basin and connected with a 4-inch soil pipe, communicating directly with the sewer. The sketch showing my arrangement will explain my views. The larger of the cans will contain two gallons, and is intended to be used solely for holding water for domestic use.

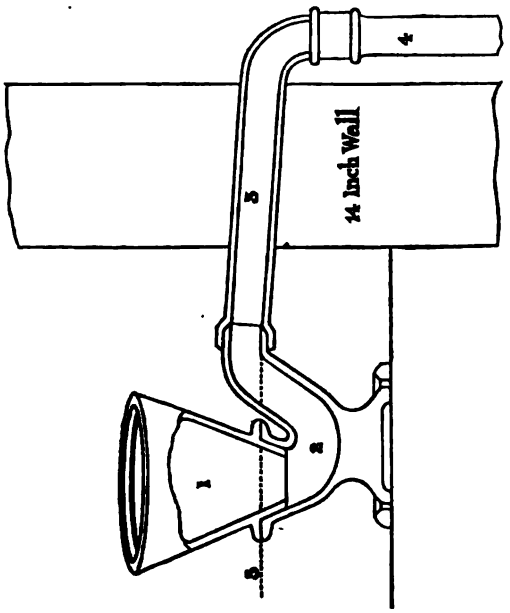
I have had eleven hundred of these cans distributed to the tenants of sundry court houses in Liverpool, one to each house, the average number of inmates being five, and have ascertained from frequent tests, extending over many weeks and made in different districts, that the consumption of water does not exceed two and a half gallons per head per day; this average includes the extra water used at the weekly clothes washing.

I have frequently endeavoured to induce the tenants, without effect, to use more water, but all appear well satisfied and say they could not use more.



The smaller can is for flushing the safest and least expensive of water-closets such as my rough sketch shows. The contents of a can, containing say one gallon, passed quickly into the pan carries before it into the sewer all that is objectionable, the water contained in the receptacle at the back part of the can effectually recharging the trap.

With this arrangement no mechanical appliances are required or ventilation requisite, neither is there any possibility of the domestic water-supply being injured in any way.



The flush can is filled by an ordinary tap placed either inside or outside the closet, and I recommend for houses of the best class that a number of such cans, kept charged, be placed in each closet.

By going into detail I could show very many advantages to the users of such closets and cans as I describe.

WM. BENNETT.

Liverpool, 14th June, 1880.

VENTILATION OF SEWERS AND DRAINS.

Your correspondent 'A Master Tradesman' says that he is 'again amused' at what I write; and his amusement seems to show itself in using such terms as 'a master mind' and 'one of the newest (sanitarians) of the new school', as to himself; and such terms as 'inexperienced or short sighted men', 'sanitary dabblers', and 'ignorant apprentice', as to those who differ from his views.

After all, wherein do the views of your correspondent of the 'master mind' and my own differ? He says he allows of having acted on the principle of the putting in of a sewer ventilating pipe beyond the drain trap; I have advocated this for years, but because I prefer a mason's trap and he a syphon trap, he is the 'master mind' and I the 'ignorant apprentice'!

I pointed out that by sudden storms, etc., pressure might be put, and would be put, on the gas in a sewer, if it was allowed to accumulate there; this first 'amused him'; now he says, 'the high pressure of air in the sewers is in ninety cases out of a hundred purely imaginary' (what 'cases' does he mean?), and he then adds, '*more especially if the sewers are ventilated in the middle of the streets*'. I therefore conclude that he allows that if there is no such ventilation there *is* 'pressure' (the italics are my own). Instead of having ventilators under your nose in the middle of a street, I would have a ventilating pipe to each house, running up to three or four feet above the roof. Instead of these ventilating places being at long intervals, I would consequently have them at every ten or twelve yards. With due deference to the 'master-mind', I prefer my plan to his. He says that a mason's trap close to the wall is 'courting dampness and danger'. I have had one there for some time, and have not as yet suffered from either one or the other.

I can tell your correspondent of towns where, in the principal hotels, the closets ventilate into, and are lighted from, the passages; where even the soil-pipes are not carried up to the open air—where, in all probability, there is no trap of any description—where there is certainly no ventilating pipe outside the house. When such abominations as these exist, and not in private houses, but in hotels and lodging-houses, where unsuspecting travellers are taken in, in more senses than one, it is surely beside the mark to take up your space as to the relative value of a mason's trap or of a syphon trap. I think that everywhere, more especially in seaside places, a trap of some description should be as necessary and as much inquired about (in lodging-houses) by visitors as closets; and a ventilating pipe from this trap, whether mason's or syphon, and whether at the back or the front of the house, should be just as much a matter of course as a rain-water pipe. J. R. T.

PEASANT LIFE IN THE WEST OF ENGLAND.

I am engaged in collecting for early publication, facts bearing upon the present social and educational status of the peasantry of the western counties; and I should esteem it an especial favour if you would kindly afford me the advantage of your wide circulation in order to invite from correspondents in the agricultural parts of those counties, such facts bearing upon the subject as may supplement the information I hope to gather during a tour of enquiry that I am about to undertake through the western districts.

The circumstance that such facts as I am anxious to obtain, are likely to prove of public utility will furnish, I trust, my apology for trespassing on your space.

FRANCIS GEORGE HEATH.

Brunswick Lodge, South Hackney,
June 30, 1880.

SPLENIC FEVER.

On the 5th, the steamship *Iowa*, from Boston, landed 804 head of cattle alive, and one dead, at this port. 43 died during the passage, and were thrown overboard. As soon as we commenced slaughtering, it was noticed that some of the animals were affected with splenic fever, and two carcases were seized on this account on the 7th, and six more yesterday and to-day. This morning an application for an order to destroy these eight carcases was applied for and obtained. Up to the present the disease appears to be of a somewhat mild type. There are no carbuncles, abscesses, or pustules, and there is no erysipelas, but some of the cases have manifested distinct head-symptoms, while a few of those yet in the lairage are obviously affected. The slaughtering is still going on under the supervision of the officers of the Sanitary Authority.

FRANCIS VACHER.

Birkenhead, 9th August, 1880.

MOVEMENT OF GASES.

I read with much interest Mr. Eassie's paper at page 10, Part 13, explaining Professor Wanklyn's experiment in 1861 upon the movement of gases, and am much pleased to see that Mr. Eassie has promised to give us the results of experiments he intends to make himself. There is a considerable amount of popular ignorance upon this subject, and anything tending to dispel that will be a public benefit. Many people do not understand about the diffusion of gases. I have even heard a member of a scientific society publicly state that in an ordinary room the carbonic acid collects at the bottom of the room! It strikes me that in most rooms, especially after the gas is lighted, the best air of the room is at the bottom, while a current of air will often be found passing towards the fire along the ground from the door. This current is often colder than the superincumbent air, and being a current, shows the wisdom of those who invented footstools.

The following experiment, made by Count Bertholet, a native of Savoy, and a celebrated chemist, who died at Paris in November 1822, shows that it would be rather a difficult task, under ordinary circumstances, to find a room in which the carbonic acid was collecting at its floor. He took two globes, as here sketched, which could be screwed together, and placed them in a cellar. The lower globe was filled with carbonic acid, the upper globe with hydrogen. Communication was established between them, and at the end of a certain time (I am not aware how long) it was ascertained that the gases had become intimately mixed—in fact, the proportion of carbonic acid and of hydrogen was exactly the same in both globes.

Seeing, therefore, that even under such unfavourable circumstances these two gases, of such unequal density, mixed in a quiescent state, it is absurd to imagine they would not mix even far more easily where the air has a certain amount of motion in it, as is the case in all inhabited rooms.

Glasgow, 31st July, 1880. W. P. BUCHAN.

INFECTION IN TYPHOID FEVER AND IN DIPHTHERIA.

In reviewing my pamphlet on 'Artificial Disinfection', in the SANITARY RECORD of last month, a fear is expressed that my remarks on typhoid fever and diphtheria may lead persons to suppose that those diseases are comparatively non-infectious, and self-generated. I have certainly assumed that they may be of pythogenic origin; but I have added that when they have once been thus generated, exposure to infection may reproduce them. Concerning diphtheria I have said, p. 44, 'It is much influenced by local and atmospheric conditions, by which it is sometimes generated; but it often occurs in well-drained towns and in houses which are clean and well ventilated, and it is decidedly infectious. It may be arrested by a proper system of disinfection, but for this it is necessary that special care be given to the disinfection of out-door drains and cess-pits, as well as to the interior of the house in which it may occur.' And I have there given reports of outbreaks of diphtheria, which had been suppressed by those means.

Outbreaks of typhoid fever have been dealt with in the same way, and with the like success. The ollowing is an interesting case in point. An outbreak of typhoid fever occurred at Sundridge last September, when four families became infected. All of them had used water from a well, of which the contents were analysed by Dr. Frankland, and found to consist chiefly of soakage from sewers and cesspools. It contained actual soluble sewage matter, and was dangerous water, utterly unfit for dietetic purposes. A nurse who had had four years' experience in the work of disinfection was placed in charge of the cases on the 6th of October. In one house a young mother and two children were ill; in another, a man; in a third, three boys and a girl; and, in the fourth, in which the nurse took up her abode, the father of the family, his apprentice, three children, and last of all the wife fell ill: fourteen cases in all. The use of the water in the polluted well was discontinued, and pure water was provided from another well. The nurse visited all the four houses daily for three weeks; and, besides giving her assistance in nursing the sick, she attended personally to the work of disinfection in every case. Some of the cases were severe, but all recovered; and the further spread of the disease was completely arrested. The nurse returned home on the 27th of October. She was then suffering from nausea; in a few days she had chills; by the 8th of November, the characteristic symptoms of enteric fever had become fully manifest; and on the 22nd she died. Here we had, first, the generation of typhoid fever by the use of polluted water; and, subsequently, the communication of the disease to the nurse, who, from the nature of the duties which she had to perform, could not protect herself as she protected others from the danger of contagion.

I believe carbolic acid, if properly used, to be a certain disinfectant in typhoid fever. It has prevented its communication to the inmates of a house in which the water used by them was contaminated by the discharges of typhoid fever patients in an adjoining house: a fact which was discovered through the water in their well having become perceptibly tainted by the carbolic acid which had been employed for their disinfection. But the suppression of typhoid fever will depend upon the promptitude and thoroughness with which the work of disinfection is carried out; and it is from the want of this that sanitary officers so often fail in their endeavours to eradicate it. J. H. TIMINS.

West Malling, Kent, August 5th, 1880.

THE VENTILATION OF SOIL-PIPES.

Can you tell me, in your next, whether I am not right in recommending as the latest, that the soil-pipes form their own ventilators best by being carried up in full calibre to the eaves thus:

I am induced to trouble you, because a practical plumber has just told me he has always been in the habit of taking a ventilating pipe, of smaller calibre, from about the point A, which he says prevents accumulation of gas in bend.

My own belief is that insistance on these two points of continuation of soil-pipe straight up and of same calibre is the best plan. Is this view borne out by the experience of others?

J. MAY, Jun., M.O.H. for Devonport.

Exmouth Villa, Stoke, Devonport.

[The best way to ventilate the 'closet descent pipe' is to carry up the soil-pipe, the full sectional area up

to the roof, say six or ten feet above, and remote from any window or chimney. Sometimes the space between the closet basin and the closet trapping water is ventilated by a small pipe to the outer air, but this will not effectually ventilate the closet and keep it sweet. The foul air in the soil-pipe requires a full diametered pipe up to the roof. It is well to ventilate above the closet trap as well, but if this be done, such smaller pipe must not be taken into the soil-pipe, but be treated rather as a separate ventilating pipe with the same precautions as to place of termination, unless it be close to a blank wall, in which case it might be simply taken through the wall.

We should be glad to open a correspondence on this head, with cuts illustrating the best methods of dealing with the matter.—ED.]

NOTICES OF MEETINGS.

THE NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE.

The congress of this association is to be held in Edinburgh from October 6th to the 13th. The special questions concerning Public Health to be considered are the following:—1. What are the best areas for sanitary purposes, and how far should there be a revision of the mode of electing and continuing the services of the officers under the Public Health Acts? 2. What is the best mode of amending the present laws with reference to existing buildings, and also of improving their sanitary condition, so as to render them more healthy, having due regard to economical considerations? 3. What are the means which should be adopted for the prevention of the pollution of streams, without undue interference with industrial operations, and for the preservation of pure sources of water supply.

THE INTERNATIONAL CONGRESS OF HYGIENE AT TURIN.

The programme of this Congress is arranged as follows:—Monday, Sept. 6, grand opening ceremony, in presence of King Humbert. Orations by Sig. Ferrario, the Syndic of Turin; Dr. Fauvel, of Paris; Baron Maydell, of St. Petersburg; Doctor Finkelburg, of Berlin; Herr J. G. Jäger, of Amsterdam; Doctor Felix, of Bucharest; and other delegates. General business of the Congress:—Tuesday the 7th, Thursday the 9th, Friday the 10th, and Saturday the 11th of September, will be occupied by meetings in the mornings, and entertainments in the evenings; Wednesday the 8th, Excursion; Thursday the 9th, meeting of the International Drinking Water Association; Paper by Herr J. G. Jäger. Sunday the 12th, Excursion to Milan, to be present at experiments in cremation. The general meetings of the Congress will be held at the Palazzo Carignano, and the meetings of sections will take place at the University. The Turin National Exhibition of the Fine Arts will remain open during the Congress. The members of the Congress are requested, on their arrival in Turin, to proceed to the Townhall (Palazzo di Citta), to obtain a Guide, prepared by the civic authorities, and to obtain all necessary information. It is probable that circular railway tickets, between France, Germany, and Italy, will be placed at the disposal of members of the Congress by the exertions of the Turin Committee. A reduction of 30 per cent. is now allowed on all the Italian railways and steamboats. Visitors are requested to contribute models, plans, apparatuses, instruments, and books, concerning sanitary science. Newspaper correspondents will participate in all the privileges of the members of the Congress, on making themselves known to the Organisation Committee. Any further information can be had by writing to Professor and Senator Pacchiotti, 25, Via San Francesca di Paola, Turin.

THE PUZZLED CENSUS-TAKER.

BY JOHN G. SAXE.

'Got any boys?' the Marshal said,
To a lady from over the Rhine;
And the lady shook her flaxen head,
And civilly answered, 'Nein!'

'Got any girls?' the Marshal said
To the lady from over the Rhine;
And again the lady shook her head
And civilly answered, 'Nein!'

'But some are dead?' the Marshal said
To the lady from over the Rhine;
And again the lady shook her head
And civilly answered, 'Nein!'

'Husband of course?' the Marshal said
To the lady from over the Rhine;
And again she shook her flaxen head
And civilly answered, 'Nein!'

'The plague you have!' the Marshal said
To the lady from over the Rhine;
And again she shook her flaxen head
And civilly answered 'Nein!'

'Now what do you mean by shaking your head
And always answering "Nine?"'
'Ich kann kein Englisch!' civilly said
The lady from over the Rhine.

NOTES ON EPIDEMICS.

[We propose to give from time to time, under this heading, such facts as we can glean from reports of health officers and from other sources as to the etiology and spread of infectious diseases as observed by local investigators. It is highly important to codify these local experiences, but the task has never yet been attempted. We would venture to express a hope that this column may eventually be found of considerable assistance in this regard, and we earnestly invite all medical officers of health to favour us with their experiences. We shall, moreover, be glad to give space, under this heading to discussions on the causation of epidemics, especially of those diseases the origin of which is still obscure.—ED.]

SPREAD OF DIPHTHERIA.

Dr. Ogle's report on the spread of diphtheria is an interesting contribution to a subject on which we are sadly in want of precise information. The hypothesis, however, of the infection having reached to thirteen scattered houses through the attendance at chapel of one girl, 'who was still suffering from a sore throat, of *probably* a diphtheritic character' seems at best a doubtful one. Diphtheria spreads in the same mysterious manner among the scattered populations of rural England attendants at county churches, as it does among the chapel goers of North Wales, and even when this theory of chapel attendance is applied to another group of diphtheria cases in Wales (Llanddausaint sub-district), it entirely breaks down. I venture to think that Dr. Ogle will find that the atmosphere is the true poison carried in these cases of wide-spread diphtheria. The 'cacozymes' or cryptococci resulting from the aërial fructification of a specific fungus, in certain conditions of the atmo-

sphere, are scattered broad-cast, and lodging on the mucous surfaces of delicate persons, eat their way inwards, multiply and produce diphtheria. By similar means is ring-worm spread; and the potatoe blight, *peronospora infectans*, can only thus reach these useful plants, which, at all events neither crowd in chapels or schools. Instances are not uncommon in which children living in houses strictly isolated, who have not left their own roofs for twelve or fourteen days, have been struck down with diphtheria when walking in their parents' gardens. A remarkable case of this nature was reported by Dr. Budd of North Tawton, in a late number of the SANITARY RECORD, and I could furnish two of a similar nature from my own note-book.

EDWYN J. SLADE KING, M.D., S.Sc. C.
Ilfracombe, July 1880.

SANITARY INVENTIONS.

'THE WILSON' PORTABLE COOKING RANGE.

THIS range has been designed by the Wilson Engineering Co. (limited) to accomplish the desirable objects of combining the production of the largest amount of heat by the smallest practical quantity of fuel; the combustion of the smoke and its accompanying gases which at present escape into and vitiate the air; and of affording greater space in ovens and boilers than has hitherto been attained in close ranges. The patentees claim that a joint of meat twelve pounds weight, and three puddings, can be cooked; and that seven gallons of water can be heated at the same time by a consumption of seven pounds of coal. An air-valve regulating the fire, so that almost all the heat engendered is employed in the range, and but little passes up the chimney, thus rendering a fire in the latter almost, if not entirely, an impossibility. The combustion of the smoke and the noxious gases is ingeniously effected by means of intensely super-heated air. The cold air, in the first place, being admitted through a ventilator in the fire-door, is made to travel through flanged chambers of which the fire-box itself forms in every case one side; in this passage it is thoroughly heated, and meets the smoke and gases as they leave the fire-box, where the progress of the latter is somewhat arrested by means of a plate called a 'baffle' plate. At this point the heated air and smoke, etc., mingles, producing almost perfect combustion before travelling round the flues surrounding the ovens and boilers. The range, as may be seen, therefore, is practically a smoke-consuming one, while but very little soot comparatively accumulates in the flues. In substantiation of this statement, it may be mentioned that one has been in constant use for the past ten weeks at the works, while the flues have not yet required sweeping.

In families where cleanliness takes its proper proverbial position and hot baths are required, these stoves present an appreciable advantage; by means of a patented principle a great part of the heat is made to impinge on the side of the boiler near the bottom, and travels under the whole base on its way to the flue, so that water can be very quickly heated. The boilers are made of wrought iron, so that there is no danger of their cracking or exploding. These ranges are made in various sizes and prices, and struck us as being remarkably moderate in price for the convenience and quality given. They are well worth an inspection at the factory, 22, Peartree Street, Goswell Road, E.C., by builders fitting up houses, and by private persons contemplating the purchase of a convenient and economical portable range.

SMITH'S DEODORISING AND DISINFECTING POWDERS.

Of late years, carbolic acid has taken its position in popular estimation as one of the best practical deodorisers and disinfectants for stables, cowsheds, drains, and putrefying matters generally, and is used for that purpose in nearly all the urinals and water-closets of railway stations, in the hospitals, barracks, and other public places throughout Great Britain. Smith's Pink Carbolic Powder is extensively used in this way; and, amongst other places, at Windsor Castle. The moderate price, and uniform strength and quality of this preparation of carbolic acid, are sufficient explanations of the popularity it has gained as a disinfectant and deodoriser, and make it worthy of recommendation to sanitary authorities and private consumers. We have had the patent disinfecting cleansing powder of the same form in domestic use for several years, and have found it most satisfactory for cleaning boards and wood-work generally, and for various purposes where rapid and thorough cleansing is desirable. We recommend those of our readers, who have not tried these useful compounds, to send for a sample of them to the makers, Messrs. J. M. Smith and Co., Borough Road.

SANITARY JOTTINGS.

The Chelsea Vestry have approved a report of their Works Committee that new brick sewers be constructed of the dimensions and in the localities named in the report of the surveyor, and at an estimated cost of £6,000, and that application be made to the Metropolitan Board for a loan to meet the cost of the same.——The master of a German steamer, who entered the Tyne concealing the fact that two of the crew were suffering from small-pox, has been fined £20 and costs at Newcastle.——The Home Secretary has granted to workrooms in connection with drapers' retail establishments, and workshops in which the curing of fish is carried on, an exception to the rule of the Factory and Workshops Act with respect to the period of employment between 9 a.m. and 9 p.m.——The Wolverhampton Town Council have authorised another loan of £50,000 for town improvement. This makes a total of £200,000, which, it is expected, will be sufficient to carry out the alterations in progress in that borough under the Artisans' Dwellings Act.——Mr. E. R. Heath has been appointed inspector of nuisances to the Hay (Hereford) local board to the 25th March next, at a salary at the rate of £20 per annum. He was at the same time appointed surveyor to the board for the same period, at the rate of £30 per annum.——We are glad to learn that the Metropolitan Board of Works, on the recommendation of the Parks and Open Spaces Committee, have decided to drain thirteen acres of Hampstead-heath, with the view of forming there a public cricket ground.——At a recent meeting of the St. George's (Hanover Square) Vestry it was decided to agree to an extension of the Davies Street (Berkley Square) Baths, at a cost not exceeding £2,500.

ORIGINAL PAPERS.

ON SEWAGE DISPOSAL.

By HERBERT PAGE, S.Sc.C. Cantab.,
Medical Officer of Health for Redditch.

FOR the information of the Redditch Local Board, I last year visited the neighbouring towns of Alcester, Bromsgrove, and Evesham, for the purpose of seeing the systems and action of the sewerage works adopted in those places. It has occurred to me that a brief explanation of what I then saw, and of the lessons which appear to me to be capable of being learnt from the experience of these towns, may perhaps not be uninteresting or unprofitable to readers of the SANITARY RECORD. I therefore subjoin the substance of a report which I made to my Board on the subject, together with certain general observations which arise out of the report. I should mention that in the original report the experience of the towns I visited was applied more particularly to the case of Redditch, but as it may be perhaps more generally applicable, I have availed myself of the permission of the Editor to print here the facts which I gathered in the course of my enquiry.

ALCESTER.—On July 11th, 1879, I visited Alcester, and, in company with the energetic Inspector of Nuisances (S. Inst. C. Gt. Brit.), carefully examined the whole of the sewerage works constructed for that town in 1878, for a population of about 2,430. The *Sewerage* consists of about two miles of glazed stoneware circular pipe sewers laid upon the straight-line system, having man-holes at each point of lateral deviation, and man-holes and ventilators at each point of change of gradient. The diameter of the sewers varies from 9 in. to 12 in., and have a general gradient of 1 in 400 ft. The material used for joining the pipes is well tempered clay. Pipes having oblique junctions are laid opposite every one or two properties, so that the line of sewers will not have to be disturbed when premises are newly drained. These junctions are temporarily occluded by glazed stoneware discs set with clay. The site of all junctions is marked on a plan, and also by an arrow-head on the wall of the house or building nearest to it. There are fifteen brick man-holes, with wrought-iron horse-shoe footings or steps, placed in the centre of the roadway, located at intervals of about 300 yards. The depth of the man-holes varies from 2 to 12 ft. They act as ventilators, being covered with an hexagonal cast-iron perforated grating. The storm water is admitted into the sewers. There had been no considerable rainfall for several days previous to my visit; the sewage was everywhere in gentle flow towards the outfall at each of the nine man-holes, which were opened for my inspection; there was no effluvium from any of the ventilators, with the exception of one which had been almost entirely closed by mud, the odour was extremely faint, and only perceptible within the man-hole, or at the ground level. That the ventilation of the sewers and circulation of the sewage was satisfactory was shown by a small flame, held in the ventilators in various parts of the town, being strongly deflected downwards. At the time of my visit no means, other than by water-cart, existed for flushing the sewers, but arrangements were being made, and have since been completed, by which the sewers are cleansed by flushing once a week from the mains of the Alcester Water Works Company, for a payment of £20 per annum. The *Removal of Excreta* is to a great extent effected by water carriage. That horror of sanitation, the barbarous old midden-cesspit system, which originally stored up the greater part of the sewage in the town, is being rapidly swept away and replaced by water closets constructed in the old privies. At the date of my visit there were 200 water closets. I carefully examined the detail work of these; the disconnection and proper ventilation of the soil-pipe, trap, and closet, in every case of the many closets I examined in all parts of the town, and upon all classes of property, were satisfactory: this is attributable to the careful and continuous personal supervision of the Inspector. The closets were everywhere odourless, and models of cleanliness. In one instance only did I see a closet temporarily stopped up, owing to a piece of scouring flannel or like material being carelessly thrown into the pan. In these cases the Local Authorities charge 2s. for unstopping, and keep a vigilant eye upon the negligent users for the future. *House Drainage.*—Yard and house drainage is made with 6 in. glazed circular stoneware pipes, with 4 in. branches. Every direct communication with the sewers is cut off. House drains are made to deliver in free air, above the iron grating of a small sized glazed stoneware mid-feather ventilated trap. All the drains are additionally ventilated with 3 in. iron pipe carried up from the highest point. The fall of the yard is made to flush the trap. The absence of effluvia from the closets and drains in the many yards I entered was most noticeable. The *Outfall Works* are situated about half-a-mile beyond the town, on its south side, beside a rivulet of the Arrow, which, being subject to floods, and the level of the ground being below flood level, has necessitated the embankment of the sewage farm. The embankments surround the farm, and are about 7 ft. high. The area of the farm is three-and-a-half acres, divided into two plots of unequal area, separated by a bridle road (each section is surrounded by embankments); one plot contains two acres, the other one-and-a-half acre. The level of the entire farm has been excavated some 5 ft. The larger section of the farm is subdivided into four beds, and the other into three beds, for plant cultivation. Each section has been carefully and properly under-drained. Irrigation, supplemented by intermittent downward filtration, is the system of sewage purification adopted. At the outfall the sewage is received into a small tank, from which it is directed by sluices at will into the main carriers, right or left, and thence by eighteen small carriers to the ridges of the bed to which it is desired to be applied. The beds are worked alternately. A communicating sewer under the bridle road conveys the sewage to the main carriers of the second section of the farm. One-half of the farm was under cultivation at the time of my inspection, the crops being cultivated were cabbage, mangel-wurtzel, carrots, peas, and potatoes. The plants were all looking strong and healthy, notwithstanding that the surface soil was comparatively poor, owing to its having been newly made by excavation; consequently the full equivalent of the sewage could not be expected to be represented by the plant growth. At the time of my visit two of the beds had been at rest two days, traces of semi-dried sewage-sediment were present at the margin of some of the ridges which had not yet been dug. There was, however, notwithstanding the absence of rainfall, and a high temperature of the air, no traces of sewage effluvium. The effluent from the beds flows through a circular brick tank lined with white enamelled tiles, located one in each section of the farm, at the side most remote from the main carrier;

the effluent, as it passed through these tanks, was perfectly clear and free from suspended matter. It is thence discharged into the brook running into the river Arrow. The whole farm was in excellent cultivation; weed growth was everywhere absent. At present the Local Authority is carrying on the farming in order to ascertain its productive capacity. The working expenses are £1 per week to one man for working the ground and attending to the flushing of the sewers. The cost of these entire works was £2,550. Evidence of the extent of the action of the air, soil, and vegetation at the farm will be found at the end of this paper in the form of an analysis of the sewage as it arrives at the outfall, and of the effluent as it is discharged into the river.

BROMSGROVE.—*Sewerage.*—I visited these works December 23rd, 1879, accompanied by a local gentleman who takes considerable interest in them. The population benefited is about 7,000. The sewers have existed for some time, and are not contemporary with the outfall works. The principal sewer is constructed of common bricks, and extends from the Workhouse, through the main streets, to the outfall works. Surface water freely enters this sewer, and a brook is occasionally used to flush it with. Some provision is made for ventilation by means of ordinary iron rain pipes, which are carried up vertically to an elevated (12-15 ft.) point outside some convenient adjoining building. The *Disposal of Excreta* is chiefly by the midden system. Water closets (the number of which is not known) exist, I am informed, in all good houses; there are also some attached to the cottages of the poor: in these cases they are hand flushed. There are also the ordinary coal-ash closets in use. The *Outfall Works* are the latest sanitary work at Bromsgrove. They were constructed in 1877. The sewage at the outfall, which is situated about a mile beyond the town, is received into a small tank, from which it is directed into an oblong tank (of which there is a duplicate), sub-divided into four compartments. The first and third act as settling tanks, the second and fourth are filled with angular stones and act as filtering tanks; the course of the sewage is therefore alternately downwards and upwards throughout the series. There is a valve and 'mud'-well connected with each subsidence tank, into which the deposit is from time to time run, and utilised on the land, or sold. From the tank the sewage, which is now almost entirely freed from suspended matter, is conveyed in a long open brick carrier, some 400 yards, to the farm. The land is under-drained, and under cultivation, and is divided into four plots, the ridges of which are fed by a separate branch from the main carrier. After the effluent sewage has been utilised by its application to plant growth by irrigation, the residue is allowed to filter through the land into the prepared effluents, and is thence discharged into the river. Provision is made, by means of a sluice at the end of the main carrier, to discharge the tank effluent directly into the stream in case of necessity through floods. An analysis of the sewage and effluent will be found at the end of this paper.

EVESHAM.—*Sewerage.*—On December 16th, 1879, I visited this town and inspected the sewerage works, accompanied by the Medical Officer of Health for the district. The works were constructed in 1878, for a population of 4,888. The sewerage works may be divided into two sections, one for the town of Evesham proper, and the other for the outlying district of Bengeworth. The straight-line system of impervious pipe sewers is adopted throughout. The diameters of the sewers range, I believe, from 6 in. to 12 in., and are ventilated by shafts rising to the road level, covered with perforated iron gratings. The position of some of these ventilators is highly objectionable; for instance, one at the top of Bridge Street, a very narrow but main thoroughfare, is situated only about 9 ft. from a house; a second, in the same street, at the junction of Cowl Street, is about 5 ft. only from the front of a shop, and 2 ft. only from the paving of the crossing. Towards the outfall the sewers from the town converge in two lines of 12 in. pipes, forming a Y-shaped junction, from which point to the outfall they are continued in a sewer of the *same diameter*, viz, 12 in. This grave error has since been rectified by the insertion of a tumbler bay, and an additional pipe sewer. The sewage from Bengeworth is taken by a single straight-line pipe sewer to the outfall. This sewer outfall is very bad, being very considerably (10-12 ft.) *lower* than the level of the outfall from the town, and has necessitated, since the original completion of the works, the erection of a small steam-engine and tank, from which to pump the sewage of this 'low-level' sewer, as it is called, to the level of the common outfall tank. This engine is not worked continuously, so that in the intervals of pumping the sewage collects and is dammed up in this 'low-level' sewer for the extent of about 200 yards along its course, which is through meadow land, fortunately removed from the vicinity of dwellings. The *Disposal of Excreta* is by means of the midden-cesspit system. I was glad, however, to learn that it is about to be abolished. The *Outfall Works* are situated half-a-mile beyond the town. The town sewage is received into an outfall tank, and that from Bengeworth is pumped into the same receptacle; from thence it is conducted into a 'settling-tank', to deposit its suspended matter. These tanks are in duplicate, and have been fitted with a chain-pump worked by the above-named steam-engine to raise and discharge the 'mud'. On the day of my visit there was a very considerable accumulation of this, mixed with road-sweepings, within the outfall yard, near the tanks. Instead of being worked alternately, both these tanks, when I saw them, were full of sewage having a thick black crust upon its surface, and giving off abundant vapours of ammonic-sulphide. Lime-chloride was freely strewn upon the surface of the sewage. The temperature of the air was low, and had been so for several days previous to my visit, and there was a slight rainfall; nevertheless the odour of these outfall works was very pungent and disagreeable. From the 'settling-tanks' the effluent flows into the pipes of the under-drained land, which is intended to further purify the sewage before its discharge into the river (Avon). Filtration, apart from irrigation, appears to be the sole method of purification designed to be adopted, as the ground into which the tank-effluent is discharged is low-lying meadow land, producing only rank grass, and subject at times to submergence by floods. In this land there is laid, I believe, five rows of pervious pipes, with apertures left between their extremities, placed in trenches filled in with material so as to be more or less pervious, designed to receive the effluent from parallel and corresponding pipes connected with the main pipe from the settling-tanks, after it has filtered through the intervening ground. These effluent pipes run with a straight course to the river, which flows close by, parallel to the side of the meadow. The river outlets of the effluent pipes are covered by an irregular facing of stone. At the time of my visit *no trace of effluent discharge could be seen* at those

parts of the facings above the water-line, the greater part of the facings was *below the level of the river*—submerged—which was not, I was informed, at more than its ordinary height. There is at these outfall works *no provision for the utilisation of the sewage by irrigation and plant cultivation.* It is difficult to understand how such low-lying meadow land, producing only coarse grass, subject to being water-logged and submerged by floods, with the greater part of the effluent-outlets under water in an ordinary state of the river level, can be depended upon to efficiently purify the sewage.

I would conclude by a synopsis of what appears to me to be the lessons to be learnt from the works as recently carried out in these towns, and which ought to be utilised for the sake of the public health in the construction of the sewerage works for other places. (1) Nothing but the most perfect engineering and workmanship obtainable should be allowed in the work, either of the public sewerage or the house drainage. On the neglect of this, upon so-called economic grounds,

Analyses of Sewages and Effluent Waters.

Place.	SEWAGE. Grains per Gallon. Solids.	SEWAGE. Grains per Gallon. Cl.	SEWAGE. Parts per Million. Free Ammonia.	SEWAGE. Parts per Million. Albuminoid Ammonia.	SEWAGE. Oxygen required to oxidise (60°C in presence of H_2SO_4).	EFFLUENT. Grains per Gallon. Solids.	EFFLUENT. Grains per Gallon. Cl.	EFFLUENT. Parts per Million. Free Ammonia.	EFFLUENT. Parts per Million. Albuminoid Ammonia.	EFFLUENT. Oxygen required to oxidise (60°C in presence of H_2SO_4).	Notes.
1. Alcester	137	15.0	68.60	22.00	207.9	70	9.2	14.12	1.84	27.9	From Land.
2. Bromsgrove	68	7.5	32.50	26.50	46.3	24	6.5	15.00	7.00	12.7	From Land.
3. Evesham	385	38.5	1300.00	50.00	351.9	120	23.1	1230.00	40.00	109.9	From Tank. River outlets submerged.
Mean of above	176	20.3	467.03	32.8	202.0	71.3	12.9	419.70	16.28	50.1	....
Mean of {Alcester .. Bromsgrove}	102	11.2	50.55	24.25	127.1	47	7.8	14.56	4.42	20.3	....
4. Redditch	45	8.8	26.20	14.00	95.9	25	4.4	18.00	13.00	31.9	After flow of 1500 yds. and admixture of fresh stream.

1. There exist about 200 water-closets. Works of sewerage recently (1878) carried out.
2, 3, 4. Much sewage stored in the town, owing to prevalence of midden-cesspits.

or from ignorance; the imperfections, and sometimes actual dangers to the public health from some sewerage plans, may be traced. (2) Progressive and continuous gentle *movement* of the sewage everywhere towards the outfall, together with (3) thorough ventilation of the sewers of the yard and house drains, coupled with the (4) efficient and cleanly removal of excreta, (all of which points are exemplified at Alcester), constitute the *basis* of effective sanitary work. (5) The use of Portland cement, or other equally good material, in joining the pipe sewers, should be adopted instead of clay, as, by the forces at work within and without a sewer, it is, according to a high authority (Baldwin Latham, C.E.), 'liable to get worked out of the joints' by the influx and efflux of water. The soft material, by the superincumbent pressure, is 'squeezed out of the lower part of the socket of the pipe', and the regularity of the line of the pipes and their bed is disturbed. (6) Old brick sewers, such as exist at Redditch and Bromsgrove, should most certainly be completely done away with, and not be allowed to be 'worked into' any new sewerage. Passing on to the outfall works, most certainly also sewage should not be retained in tanks, as I saw at Evesham, until it is undergoing advanced decomposition, because a great principle of sewage-farming is to apply the sewage to plant growth as fresh as possible, and an equally great canon of sanitation is not to store it up, as by the old midden system, in the vicinity of dwellings, but to remove it as speedily as possible. (7) For the ultimate utilisation of ordinary sewage there is no known plan more efficient than that of combined irrigation and intermittent downward filtration, the ultimate object being the realisation again, in part at least, of the original value of the sewage, in the shape of plant growth, as is aimed at at Alcester and Bromsgrove. Certainly filtration alone, after mere subsidence, and that through land not specially cultivated by plant growth, as at Evesham, cannot be relied upon to effect continuous efficient purification of sewage.

With the view of making the subject matter of this paper as clear as possible, I have appended sketch-plans of the outfall works, and also a chemical analysis of the sewage and effluent from each of the places treated of.*

SANITARY REFORM IN JAPAN.†

By J. A. EWING, B.Sc., F.R.S.E.,
Professor of Mechanical Engineering in the University of Tokio, Japan.

THE recent epidemics of cholera have aroused a wide-spread interest in the subject of sanitary reform, and the engineering aspect of sanitary reform in Japan has not yet received the attention it deserves. Notwithstanding all the recent progress in medical knowledge and scientific knowledge generally which Japan has recently made, and notwithstanding the labours of the Sanitary Bureau and the Board of Health, there is as yet little if any improvement in the water-supply or in the drainage of towns and villages. I use this word drainage in its widest sense, meaning by it all actual or possible methods of disposing of refuse matter, or any matter which is prejudicial to health if not removed.

Both in regard to water supply and sewerage the present state of things in Japan is excessively bad, and everywhere conditions are present favourable to the propagation of epidemics. Let us consider the water-supply of Tokio and its suburbs There are two distinct methods. The outlying and higher parts of the city get water from natural wells sunk in the soil. The supply in most of the lower parts of the city is given by means of a great system of wooden

* In the original report were given sketch-plans (not here reproduced) of the sewerage works at the three owns visited.

† A Lecture to the Students of the University of Tokio.

pipes which receive water chiefly from the river Tama through an aqueduct. There are two systems of pipes supplying the districts; one, the Tama system proper, is supplied by an aqueduct entering the city at Yotsuya, and extends over the southern side of the city. The water of the Kanda water-works enters by the valley of the Kandagawa, and supplies the northern side. This water comes partly from ponds; but, as the amount of water yielded by them is insufficient to supply the Kanda system of pipes, they draw the chief part of their supply also from the river Tama. The water is distributed by means of nearly seven thousand distributing wells, or large wooden vessels sunk in the earth and connected to the mains by short bamboo pipes. These pipes are always open, and enter the wells below the usual surface of the water. Some of the distributing wells are supplied so liberally as to be in a continual state of overflow, but in by far the greater number the water is stagnant. The surplus water in the pipes is allowed to run out at various places into the canals, river or moats. These waterworks of Tokio were executed about 230 years ago, and they certainly are a remarkable monument of the ability of the engineers of those times. The supply of water which they give is sufficiently liberal. The river Tama alone yields, or at least might yield, enough not only for the districts over which the pipes extend, but for the whole city, including those parts which just now depend upon natural wells. Moreover, chemical analysis has shown that when the water enters Tokio it is pure and wholesome; but it loses its purity as it goes through the system of pipes, and by the time it reaches the outlets where overflow takes place it is very impure.

Professor Atkinson of this University has made analyses of specimens of the Tokio water taken from different points along the course both of the Tama and Kanda systems,* and he has found that although the water is pure at the beginning, it becomes regularly and progressively less and less pure the farther it has gone through the city, until finally, at Odawaracho and at Riogoku Bashi, where there are outlets into the river, the impurity is astonishingly great. At Riogoku Bashi the amount of pollution by sewage is one part in twenty; that is to say, if you were to take nineteen bucketfuls of pure water and mix them with one bucketful of sewage—sewage of the quality of that which pours out of the drains of the city of London, a mixture would be obtained which is no more impure than the drinking-water in the Tokio pipes at Riogoku Bashi. And this mixture, filthy as it is, is carried over to Honjô for the use of the citizens there, because even it is better than the water yielded by their natural wells. A Japanese friend of mine, who is fond of putting things in an epigrammatic way, says the people of Honjô cannot distinguish their privies from their wells, at least by the smell.

There can be no doubt that this extraordinary pollution of the water which Mr. Atkinson has observed is caused by the entrance of surface water from the ground, which mixes with the originally pure water in the pipes. This surface water consists of rain and other water sinking down through the upper soil, and necessarily very full of impurities, especially in crowded districts. But the question remains: how does this foul surface water find its way into the pipes? The pipes are as a rule originally well made and fairly well kept in order, and it does not appear likely that much water should get into them from the ground. It has been suggested that the mixture takes place by actual diffusion through the wood of the pipes. This I cannot consider sufficient to account for so large an entrance of impure water. There is one other possible explanation, which is, I think, the right one. It is this:—

The distributing wells are constantly kept in open communication with the pipes. Now, under the varying conditions of demand and supply, it is quite certain that water from these wells must occasionally run back into the pipes and be carried on throughout the system, and afterwards enter other wells and be used. There is no doubt also that surface water and other impurities do get into many of the distributing wells. These are then partly carried back into the pipes, and by them are distributed over the system. This, I believe, is the chief reason for the gradual pollution of the water. Impurities get into the distributing wells because they are not water-tight, and because most of them are placed in positions which render them very liable to become polluted by neighbouring filth. Almost every well here, whether it be a natural well or one of these distributing wells, has a wooden gutter close to it into which the water which has been used for washing rice, clothes and other articles, is thrown. Too often these gutters are provided with no suitable exit for their contents, and the dirty water which is thrown into them necessarily finds its way into the earth, whence part of it returns to the well. Besides this, the soil close to wells is often polluted by the most dangerous form of contamination—the leakage from a neighbouring closet. Moreover, some of the distributing wells are themselves natural wells also, and draw their supplies partly from the ground and partly from the pipes. Examples of this sort of well are to be found in this college. My students tell me that when they want a little exercise they sometimes stop up the supply-pipe of one of these wells and then try to empty it. But they find that they cannot do so because the surface water runs in more quickly than they can take it out. Here, then, we have distinct and direct admixture of the pure Tama water with the surface water: and I submit that the same thing must happen, though to a less extent, in very many at least of the distributing wells.

Now, imagine the effect if some of the excreta of a cholera patient find their way into one of the distributing wells. Not only will they affect those persons who use that particular well, but the water will act as a carrier of the disease, distributing the fatal germs, it may be, through a large district. It is a first principle in sanitary arrangements to make every household as independent as possible of other households, separating each from its neighbours, so if disease occurs in one it may be confined to that one. You see how thoroughly this principle is violated in the system of water-supply I am now criticising. By the courtesy of the officers of the Tokio Fu, I have been able to examine into this system more fully than would otherwise have been possible, and I find (what I could not have believed unless I had learnt it from a most trustworthy and authoritative source) that if anyone wishes to connect his well to the main pipes it may be done, no matter how bad the well may be. Even if sewage is obviously leaking into it, the connection will be made, provided the owner of the well is ready to pay the annual sum charged for the use of a supply pipe. The gentleman who told me this said it was the owner's look-out whether the water in his well was good or bad: if he

* Transactions of the Asiatic Society of Japan, 1877.

liked to drink bad water that was his business. This, however, is a matter which does not concern the owner or users of the one well alone, but the whole community. Even if we grant that a man has a right to poison his own water, we may certainly take such measures as will prevent him from poisoning his neighbour's.

The best remedies for the existing evils of the Tokio water system are as follows:—The distributing wells should be clear of all likely sources of pollution. The outside of the wood should be surrounded with cement or puddled clay, so as to prevent the entrance of surface water from the soil. No stagnant gutters or leaky privies near wells should be tolerated, and everything that can be should be done to check the practice of washing articles of clothing, etc., near the wells. Loose covers might be provided to keep out dust; for dust is known to contain the germs of some forms of organic life, and very likely contains those minuter germs which propagate disease. All wells which draw their supply partly from the pipes and partly from the ground should have the pipes disconnected from them and closed. Moreover. the back-flow from the wells to the pipes might be prevented by the use of a simple flap-valve giving free admission of water into the well, but never allowing it to return to the pipe. By this, any accidental impurity would be confined to the well which it first entered. Of course the pipes should be kept in good order. This is especially necessary in the low parts of the city, where they are frequently under water, and not always running full. The whole system requires continuous and stringent supervision and control, in every one of its details, by skilled officers who understand both the sanitary and engineering aspects of the case. Without this, sanitary legislation, however judicious, and sanitary appliances, however well designed, will be of little avail.

But no remedy would be so good as to abolish the present wooden pipes and distributing wells altogether, and substitute for them a complete system of iron and lead pipes like those used for distributing water over western cities. If this were done, the water of the Tama, with its original purity wholly unimpaired, could be conveyed not only to the districts now supplied by the wooden pipes, but to every part of Tokio. The water in the pipes would have pressure sufficient to throw it to the top of every house in the city or suburbs; and it would therefore be directly available for extinguishing fires, without needing to be forced up by fire engines. Professsor Atkinson* has examined specimens of water taken from several of the natural wells of Tokio, and Dr. Geerts† has done the same for a very large number of the wells of Yokohama. Both gentlemen agree in finding that the water from these natural wells is excessively bad, except when the wells are of the deep class, and are constructed so as not to admit any surface water. One of Mr. Atkinson's results was specially interesting. He found that the water in the wells of Surugadai was particularly bad: in fact it was the worst of any he had analysed, far worse even than that taken from the city pipes near Riogoku Bashi. At first this seemed surprising, for the Surugadai wells were unusually deep, and were apparently not more liable to surface pollution than others. But presently he noticed that the level of the water in these wells was almost the same as the level of the water in the Kandagawa canal, which runs by the foot of the hill. Then the mystery was explained. The Surugadai wells draw their supplies from that canal, which is little better than a huge sewer. At Suido Bashi, just before the canal passes the foot of the hill, many of the buckets of excrement which are daily being taken out of the city, where they are not wanted, to the country where they are wanted, have their contents transferred to boats; and you may stand any day on the bridge and watch the men empty each bucket into the boats, and then wash it in the canal, whose waters, fresh with this addition to their already accumulated filth, flow on to fill the wells of Surugadai. This is of course an exceptional case; but it is by no means exceptional—it is quite usual—for the wells to be seriously polluted by the entrance of dirty water from the surface. They are made, as you know, by sinking in the ground a series of wooden tubes, each one slightly tapered, and fitting into one another with telescope joints. The hole into which these are put when the well is dug, is a little larger than the tubes themselves, and hence a ring is left round the outside in which the filled-in earth is probably more or less loose and porous, and which therefore acts as a sort of sponge to collect the surface water, whence it easily passes through the joints of the wood into the well. In very many cases the wooden tubes do not extend nearly to the bottom, but go down only a few feet from the surface of the ground, below which there is nothing but a bare round hole in the stiff soil. Close to the curb of the well there is a wooden gutter, which receives the water spilt there, and which often terminates in a hole in the ground, only a few feet away. This hole also serves as a convenient receptacle for decaying vegetables and miscellaneous dirt. And, to make matters worse, the dirty water from the neighbouring houses is often conducted to this gutter, as if the inhabitants were afraid the well would run dry, unless they returned to it what it gave. So they establish a sort of complete cycle of operations by first taking the water out of the well, then converting it into slops, and then letting it run down into the well again. And in order that the water may miss no possible chance of being poisoned, the privy is generally close by, its contents soaking into the soil, and thus charging it with the most dangerous form of filth. I could point out wells of whose horrors what I have said just now only gives a faint and inadequate conception. Take a walk through one of the worst districts of Tokio, the district of Shitaya for example, and penetrate down the alleys which run off the streets and lead to the back of the houses, and you will see the wells and the dwellings surrounded by all manner of puddles of putrid filth. The water in the wells stands almost at the level of the ground, and is so dirty—so absolutely *green* with dirt—that the people subject it to a rude process of filtering before it is fit to be usen even for washing. For drinking water, they use those wells which are a little better in their construction and of greater depth than the majority; but they, too, have surroundings which make the very thought of so using them horrible. In Osaka many of the wells are so bad that the people actually prefer to take water from the river which flows through the city.

The remedies are obvious enough: to remove all pollution from the neighbourhood of the wells by providing surface drains to carry off the dirty water, and by improving the privies—to deepen the wells and to make them watertight for a good way down—these are the main points to be aimed at. The number of wells in the suburbs of Tokio is unnecessarily large; a few good ones in well chosen positions, insulated

* *Loc. cit.*

† Transactions of the Asiatic Society of Japan, 1879.

from dwellings, would satisfy the wants of the community as well as, and be far safer than, the present multitude of badly constructed wells.

Above all, great efforts must be made in the direction of surface drainage. Indeed, of all the sanitary influences which will have to be considered when Japan begins to move in the direction of sanitary engineering reforms, none is nearly so important as the surface drainage. The task of removing the surface water from a city such as this is a most enormous and difficult task; but, at present, even the most obvious and easy parts of the work are left wholly undone. Dirty water is allowed to accumulate in places where its presence is highly dangerous, and not the least attempt is made to carry it even a little distance off, where it would be deprived of the greater part of its power of doing mischief. The problem of the surface drainage in Japan is simplified by the fact that here the excrement does not mix with the rest of the sewage, and therefore the most dangerous constituent, and the one which is most difficult to render harmless, is left out.

This leads me to say a few words about the system now in use for the removal of excrement. In Japan, this part of the sewage is treated separately, being kept almost entirely apart from other forms of refuse. From a sanitary point of view this is a great advantage, though I suspect it owes its origin rather to agricultural necessities than to correct views on sanitary matters, for it is apparently necessary to the continued fertility of the soil that the excrement should be applied to it as manure. Indeed, so much is this the case that, whereas in most foreign cities people are only too glad to have the sewage removed from their houses, and have to pay (in the form of taxes) for getting it done, here in Japan one looks on his discharges as a source of income. The system now in use is, I think, by no means a bad one, if it be properly carried out; and any sweeping change, such as the introduction of the foreign water-carriage method—even if it were practicable—would be a more than doubtful advantage. But there are many defects in the way in which your system is conducted. The receiving vessels should be emptied with regularity and greater frequency than they now are; this cannot well be done so long as it depends on a mere private arrangement between the householder and the farmer who buys the stuff. Even at the risk of increasing the cost of the process, I would advocate that the whole affair be placed in official hands and properly organised. Recently the Board of Health has advised that earthenware pots be used instead of the common wooden ones. The latter allow the sewage to leak or diffuse to some extent into the ground, where it will contaminate the surface water, and hence may poison any neighbouring wells (and unfortunately the well is never far off). Of all the impurities to which water is liable, none is nearly so dangerous as this kind of sewage. If the earthenware pots are properly glazed, their contents cannot pass through them into the ground. But it is essential that they should be properly glazed, and not be left in a porous state. The other day I went into a shop to get a pot for this very purpose, and, seeing a nicely glazed one, I was proceeding to buy it, when the owner objected, saying it was a coffin, and pointing to another pot, which was quite unglazed and therefore porous, he said it was of the proper sort for excrement. As I did not see on what principle the comfort of the dead required a glazed pot, while the health of the living was allowed to depend on a porous one, I bought the coffin; but it is evident enough that, if the practice of using porous pots for the deposit of excrement becomes general, the object of the Board of Health in advocating the use of earthenware instead of wood will be entirely defeated.

Ordinarily, you know, the pots are buried in the ground: but that I consider objectionable, for more than one reason. If, by the accidental dropping of a stone, or by a sudden frost, or by any other cause, the pot breaks or cracks, the owner will almost certainly continue to use it, rather than go to the expense and trouble of getting a new one, and so the neighbouring ground will be polluted. And again, if the pot is sunk in the ground its contents have to be taken out with a ladle, so that a residue is always of necessity left, which serves as a nucleus to hasten the putrefaction of the subsequent deposits. Now, I should place the pot above ground, and support it in a frame so that it could turn round on a horizontal axle and empty itself into the farmers' pails completely, and much more conveniently and quickly than is now possible. This arrangement requires either that the floor of the closet be raised, or that a pit be dug under it of sufficient size to hold the frame and give the pot room to turn, but this difficulty is not at all insuperable. The ground on which the frame stands should be coated with cement, or other impervious material, to allow for the accidental spilling which is likely to take place occasionally.

No doubt some of the existing evils would be avoided if the people generally had even the most elementary knowledge of what are good and what are bad conditions of living, but it is useless to expect that much can be done towards sanitary reform by the action of individual members of the community, or that they will voluntarily unite and act together. The only possible way is for the local authorities to take the matter up, and compel the necessary changes to be made. Compulsion of this kind is perfectly fair, and consistent with real freedom, for in sanitary matters what each man does affects not himself alone, but the whole community. Further, sanitary reforms of an engineering kind cannot be effected except by the design and direction of men who have received a very special sport of technical training.

I consider that the first step towards an effective remedy would be the education of a large number of native sanitary engineers, who would be officially appointed to different districts throughout Japan, and who would be able to plan and superintend all sorts of sanitary works, as well as to inspect, and maintain in the best possible efficiency, the existing appliances. They would require to possess not only engineering knowledge, but special knowledge of sanitary conditions of living, and of the modes of applying the art of engineering so as to secure those conditions. Now, if a large body of sanitary engineers were distributed over the country, intelligent supervision would be possible; measures of sanitary reform might gradually be carried out under the order of the local authorities; and the legislation of the Central Board of Health could be put in force far more efficiently than would otherwise be possible. These men would be essentially engineers, not medical officers of health, whose training and whose functions are wholly different. The district sanitary engineers would be able to introduce improved modern methods, when the time came for these to be introduced, and in the mean time would apply their scientific knowledge so as to make the best of existing materials. The training of sanitary engineers should be of a high order, quite as high as that of

any other class of engineers; and it must be to some extent special training, different from that which other engineers require. I have suggested to the authorities of this University the desirability of making sanitary engineering one of the special courses of instruction here. The professors of civil engineering, technical chemistry, and geology, have taken up the matter warmly, and have offered to take part in the teaching of this subject; and one of the professors of the medical section of the University has been so good as to offer to supplement the course by a short series of lectures on hygiene. We have drafted what is, I believe, a fairly complete course of instruction in sanitary engineering, and have submitted this draft to the directors of the college. I hope soon to hear that they have accepted the suggestion. If so, the course will be established, and when it is established I trust that many of the young men of Japan will come forward to enter on the career thus opened to them. In foreign countries the profession of sanitary engineering holds a high rank, as high as that of any other department of engineering. In Japan the subject is an entirely new one, but is certain soon to become of the very first importance. The pioneers in it will have a splendid opportunity of doing good work for their country, and securing an honourable future for themselves.

NOTES ON INDUSTRIAL DWELLINGS.

By Elijah Hoole.

VII.—WATER-SUPPLY.

Whatever difficulties have been touched upon in the previous notes on Industrial Dwellings, none have been met with which can be compared with those which beset the endeavour to supply wholesome water to buildings of this class. It would seem at first sight to be a comparatively easy matter to give absolutely pure water to any group of dwellings, especially as the supply is entirely artificial, and not dependent, at any rate for its quality, on causes beyond our control. As a matter of fact, however, absolutely pure water is not supplied by any works in existence, and water reasonably free from contamination is supplied by very few. The sources in almost every instance are polluted, and the means used to get rid of the foul matter are either insufficient for the purpose or imperfectly applied.

Even when organic matter does not exist, there is often an amount of hardness caused by other impurity which renders the water unfit for many household purposes. The evils arising from the presence of organic impurity are greatly increased by the ordinary system of distribution. Water containing a comparatively small amount of organic impurity is stored in cisterns, in which it is generally raised in temperature, impregnated with dust, and frequently with foul air, and after having thus been exposed to fresh contamination is drawn off in small quantities. The cistern being rarely or never emptied, or the water entirely changed, except at the rare seasons when the cistern is cleaned out, the only effectual remedy for the pernicious state of things just described is to get rid of the cistern altogether. Let the supply-pipe come direct from the main-pipe, which is always charged with comparatively pure water, and there will be no stagnation, no sedimental impurity, or contamination from foul air. The water will be cooler, fresher, and such organic impurities as it contains will not be increased by the influences which develop it in a comparatively stagnant cistern.

With the method of distribution usually adopted little fault can be found till the water passes into the dwelling. A more efficient system of filtration than that usually practised at water-works is indeed desirable, but when the mains are charged, and the pressure fairly maintained, the water does not suffer in quality during distribution. This is not the case where the supply is intermittent, and where the pipes are therefore alternately charged with water and air, drawing in the latter through any available inlet, and thus frequently taking in foul gas, with which the water in the pipes is afterwards impregnated.

As to the material of the pipes themselves, iron is greatly to be preferred to lead. For all larger diameters it is universally used, and it is only for the supply-pipe to the house that lead is employed. In the class of dwellings to which these notes refer the use of iron pipes is necessary for several reasons, one of the most cogent being that they cannot be cut with an ordinary knife, or removed and sold by the tenants, or others, as lead pipes can. A nail is frequently driven into a lead pipe by some careless joiner who is fixing his work in its neighbourhood, and a leakage of water or foul air takes place, which is only discovered by the mischief thus caused. The damage occasioned by the frost is entirely due to the careless manner in which pipes are fixed, and to the entire absence of protection against draught or change of temperature. As a rule, plumbers ignore the fact that exposed pipes will freeze in winter if unprotected, and, when freezing, will burst. Very simple precautions, such as binding a pipe with hay bands, clothing it with felt, or surrounding it with sawdust in a wooden casing, will render it, if the protecting coating be kept dry, independent of changes of temperature.

Waste of water is one of the difficulties with which the managers of Industrial Dwellings have to deal, and various mechanical contrivances greatly assist in checking this evil. They are not, however, all equally efficient. The first Water Waste Preventer, so-called, applied by the writer many years ago, belied its name after a short period of service, and allowed the water to flow continuously, defying every effort to stop it. Improved appliances are now to be had, among which Tylor's 'Waste Not' Tap may be mentioned, which, if left turned on, will only allow a regulated quantity —say one gallon of water—to escape, and must be shut off and turned on afresh before any more can be drawn. The ordinary screw-down valve, though greatly in favour with water companies, is not suitable for the buildings now under consideration, a constant dribbling attending their use, since the tenants cannot be depended upon to shut the water off completely. A number of water waste preventers, consisting of a small cistern, divided into two compartments, and furnished with valves, which will only allow one compartment to be emptied at a time, are now to be had, and are exceedingly useful for laundry and other uses, where the comparative stagnation of the water is unobjectionable. But for drinking and cooking purposes, now specially referred to, Tylor's valve is more suitable, being preferable to other arrangements depending on springs or counter-balance weights for the efficiency of their action.

One great safeguard against waste is to shut off the water entirely at night. By this means the consumption has been reduced to one half of the quantity previously indicated by the water meter. Some waste-preventing or self-closing arrangement is clearly necessary at all outlets, since the tenants with whom we have to deal, if they think about the

waste of water at all, consider it rather a good thing than otherwise to let the water run. The disposal of any water accidentally spilled or allowed to run from the tap after the pail or other vessel has been removed, though it appears an easy matter, is one which causes great difficulty and annoyance. The Water Works Authorities frequently object to any drain or sink being placed under the tap, in order to check waste, or to make its consequences as inconvenient as possible. On the other hand, if the smallest pipe or grating be put below the tap, attempts will be made to pour away whole buckets full of dirty water, though the grating will only take the few drops that accidentally fall from the tap. The flooding of the whole surrounding space in the first place with clean water, and in the last with a liquid not very far removed from sewage, is the inconvenient result. If the necessity for disposing of waste water is recognised, and a sink provided, it will be found that solid, as well as liquid refuse, is thrown into it and left there; the bucket is brought with its contents of dirty water, tea leaves, cabbage stalks and leaves, potato parings, and other bulky refuse, sometimes even the flannel, scrubbing-brush, and soap, in addition, and is emptied regardless of consequences into the sink, which, though it be made a foot deep, soon becomes filled and choked with solid matter, which ought either to have been burnt or consigned to the dust shoot. The only method of keeping the sinks clear is to put them in the charge of the superintendent, making it his duty to visit each, once or twice a day, and to clear them by hand. In a superior class of dwelling, where a separate sink can be given to each tenant, the difficulty is reduced, since the tenants are more careful of what is exclusively their own, and the responsibility can be readily laid upon the author of any mischief or carelessness; but it is not good policy, except in the very best kind of working class dwellings, to have the water laid on to each tenement, as the chances of leakage, waste, and damage to the rooms below are greatly increased; but where a separate supply to each set of rooms can be safely given the difficulties nearly vanish. A good place for the pail service for a number of tenements in common is in a small chamber or compartment opening from the landing of the staircase, where the consequences of leakage or overflow cannot affect the rooms.

The cost of the water must not be overlooked. Two modes of charging for it are adopted— by quantity, and by the value of the premises in which the water is consumed. The former, no doubt, would be preferable, if a fair price were fixed, and the actual quantity consumed were charged for, but the mode usually adopted by the Water Works for the supply by meter is to fix a minimum quantity, which is charged for, even though the meter indicates that less has been used, while if the meter shows any excess above the minimum this is charged for as an extra. This method of charging is obviously unfair to the consumer, and is practically a rent with extra charges for any irregularity in the rate of consumption. The charge based on the value of the property supplied with water is the one most generally adopted, and is certainly more favourable to the dwellings of the poor than to those of a higher class. As it is a fixed amount, not varying every quarter with the indications of a meter, it is, on the whole, to be preferred to the pretended charge by quantity before referred to. The rating, however, must not be based upon the actual sums received in weekly rents from separate tenants, but upon the rental for which the entire building would be let to a single proprietor, who would afterwards sub-let it.

Opinion is divided with respect to laundry arrangements, as to whether they should be in common, or distributed. It is impossible, of course, to give a separate laundry to each tenant of a single room, and for a limited number of these a common laundry offers many advantages. A copper of galvanised iron is assigned to each tenant for a whole day, or half-a-day, in the week, with a space at the washing-trough, if this be thought preferable to letting the tenants find their own washing appliances. But where separate water-supply can be given to the groups of rooms of the better class, a copper may be added with advantage, and a little scullery or laundry forms an adjunct to the living rooms which is greatly valued by the better class of tenants. Rain water is so plentiful and so cheap, and the supply from water works so dear, and attended by so many restrictions, that the former would appear a better source of supply. It will be found, however, upon examination, that even where a sufficient catchment area can be secured for collecting rain water, the cisterns, etc., for storing it will render it more costly than the other mode of supply. No saving is effected by endeavouring to combine the two, since water companies will not make any reduction in their charges on account of any supplementary source of supply. Still, for laundry purposes, where the funds will admit of it, the storage of a sufficient quantity of rain water is very desirable.

In the *Comptes rendus de l'Acad. des Sciences*, p. 231 (*Rev. d'Hygiène*, Aug. 15, 1879), M. Lechartier gives an account of his method of calculating the amount of organic matter contained in water. It consists simply in eliminating the nitrate of ammonia, and in allowing the water which contains salts of ammonia to evaporate over calcinated magnesia.

Mr. G. W. Morehouse, in the *American Journal of Microscopy*, February 1879, affirms that much time is lost by the use of too high powers. He recommends the following plan: "Use a good two-inch objective and a two-inch ocular, so as to obtain a power of about twenty-five diameters. With the two-inch we have greater depth of focus, the object is still shown with great clearness, and, most important of all, we are able to do as much searching in one hour as it would take about nine hours to accomplish with a two-thirds inch objective. In preparing the pork, cut longitudinal sections from the extremities of muscles and from other favourite localities, where the worms, in migrating, stop in greatest abundance; place the sections in a watch-glass, covering them with acetic acid, U. S. P. In a few minutes the tissues will be transparent enough to enable one to see the letters through the specimens when the watch-glass is placed on a printed page. Drain off the acid, add water and examine, or wash and transfer to a glass slip (large, with large cover, for a number of sections at once), either in water or glycerine, and cover. For permanent preservation, while the sections are still in glycerine, press them for several days between plates of glass, and mount at leisure in pure glycerine. When thus prepared, the parasites remain coloured more highly than the surrounding muscular fibres, and readily attract the eye. They are so plain that none, when brought into the field of view, can escape instant detection."

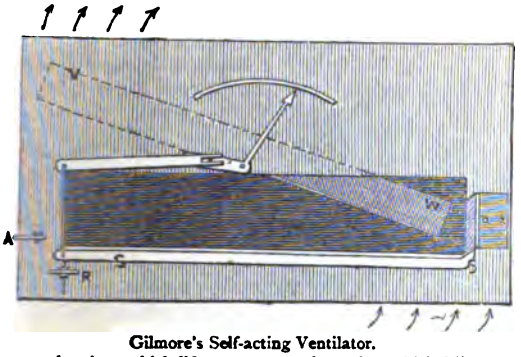
A DICTIONARY OF SANITARY APPLIANCES.

By W. EASSIE, C.E.

(*Continued from p.* 11.)

AIR.—XXXIV.

Self-acting Ventilator (continued).—In Article XXXI, I figured an automatic valve ventilator, and as I find it is now a commercial article—named the Autothermarkon—I supplement my former description. The ventilator, when closed, is divided into two compartments by a balanced valve, and as the valve opens the heated air passes into the lower compartment and out at the upper one, which is open at the back of the ventilator.



Gilmore's Self-acting Ventilator.

S, curved spring, which lifts at S; V, opening valve, which falls at W; R, temperature regulator screw; A, the alarum spring attachment.

This outlet valve can be regulated to open or close at any desired temperature, by the actuating of a screw which is placed at the bottom corner of the apparatus. As the temperature of the room increases, the curved spring lifts, and, by taking off the pressure on the levers, allows the end of the opening valve, which is weighted, to gradually fall. When a high temperature is wanted, the regulating screw is screwed up, and relaxed if a low temperature be desired. If the screw be regulated just when a room is of the temperature of 60° Fahr., it will be found best available, and will continue to act without attention. The opening spring, being free from the influence of the outer atmosphere, is actuated by the heat of the room only, and will continue in working order in a perfectly noiseless fashion. It is further to be noticed that it is a simple matter to attach to this apparatus a clock-work or electric fire alarum, in order to give notice of the arrival of any previously indicated temperature. It will be noticed that this is not a ventilator for use in flues, but in walls. It may be curtly described as an equilibrium valve for insertion in walls of buildings, opening and ridding the room of any stated excess temperature, and closing again when the admitted air has cooled the room down to the prescribed limit.

Outlet Ventilators (continued).—Within the past few years the patterns of this order of ventilators have been greatly multiplied, and I could not conclude the subject without a mention of those designed by Mr. T. Hamilton of Rochdale, in 1877.

In constructing these ventilators the chief aim was to produce an article which would appear to maintain the vacuum which is caused in a ventilating shaft exposed to horizontal currents. It was also necessary to allow for the action of high winds, which cause violent disturbances in a shaft, and if possible produce a ventilating finial which would work even less rapidly in boisterous than in calm weather. These ventilators lay thus an especial claim to attention. One novelty to be noticed is the application of the cross form to a ventilator for use in Gothic structures, but, as may be imagined, the top arm is simply added by way of completing the figure.

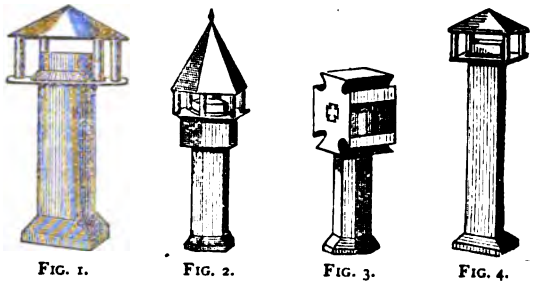


FIG. 1. FIG. 2. FIG. 3. FIG. 4.

Hamilton's Outlet Ventilators.

Figs. 1 and 4, plain deflector; Fig. 2, plain double current deflector; Fig. 3, ventilating cross.

FIG. 1.

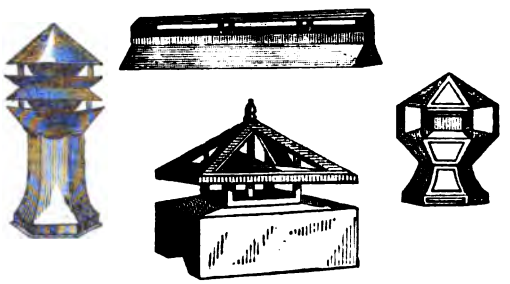


FIG. 2. FIG. 4. FIG. 3.

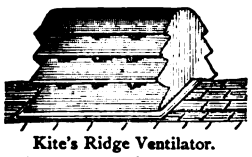
Hamilton's Ventilating Outlets.

Fig. 1, ridge ventilator; Fig. 2, double deflector; Fig. 3, regulating deflector; Fig. 4, sky-light ventilator.

The same manufacturer has also introduced a useful ridge ventilator of the order described in Articles IX and XXIII, the induced current assisting the expulsion of the warm air, The double current action is also brought to bear in some patterns. A very neat and useful ventilator for use in sky-lights, larder roofs, etc., is also brought into the market by this manufacturer, and no sooner than was necessary. The above ventilators have given great satisfaction on board steamers, and the double-current ventilators have been well tried on various voyages to India, etc., and found to do good service in the way of causing thorough up and down draughts when fitted to the saloons.

In Article XXII I gave a section of the original Kite's Outlet Ventilator, built upon the principle of the induced current action, and as this is largely used when some exhaust power is deemed necessary, presumably, for instance, when the upcast is weakened, either by the extra length of the flat-lying portion of the drain, or by the exposure of the ventilating shaft to the colder atmosphere, I now give an elevation of this article, which is made to fit pipes from two to four inches in diameter. Another outlet ventilator for insertion in the ridge of a roof is also manufactured upon similar principles by the firm of Messrs. Kite and Co. of London, and as it differs somewhat from those I have previously noticed, I

Kite's Soil-pipe Ventilator.



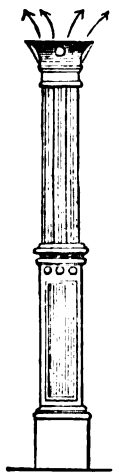
Kite's Ridge Ventilator.

now add it. It is rendered more powerful than is mostly usual, by an added tier or two of louvre work. They are manufactured in lengths varying from eighteen inches to three feet.

To the dormer ventilator already figured in Article XXVI, I now also add the pattern manufactured upon the same line of design as the foregoing, the registered article of Messrs. Kite and Co. They are made in sizes from one foot to three feet, and, if necessary, valves are added to prevent down draught.

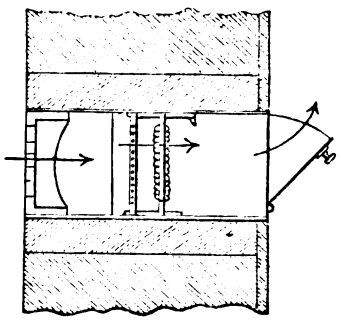
Kite's Dormer Outlet Ventilator.

Inlet Ventilators (continued).—A new and useful vertical tube inlet ventilator has lately been introduced by Messrs. Sharpe and Co. of London, and here the fresh air can be introduced in any quantity, first of all into a receiver at the base of the contrivance, and then discharged into the room through organ-shaped pipes placed at the top, by means of which the air is slightly warmed by friction, and better directed upwards. As in most other inlets of this pattern, the supply of air is regulated by the manipulation of a valve situated at the top of the shaft.



Sharpe's Organ Vertical Air Inlets.

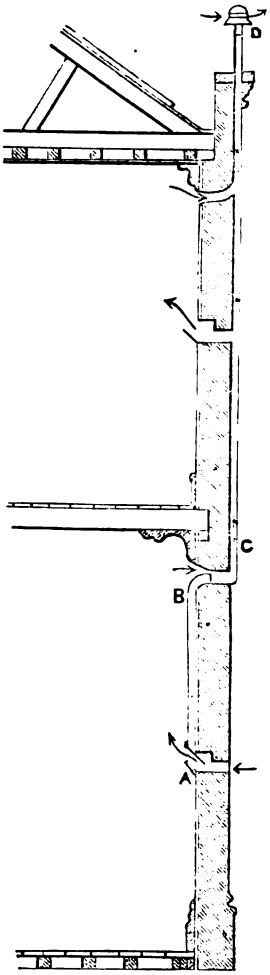
The same manufacturers have also introduced to public notice an air inlet for insertion in the walls of a room, which exhibits some departure from the principles followed out in other inlets previously described by me in Articles XII and XXIII. This inlet consists of a box fitted with partitions, which are curved upward, and the whole let in flush with the wall. When the front of this ventilating box is lowered, the cold air enters from without, if necessary, through a medicated wool filter, and becomes deodorised, all particles of dust being arrested. The curved partitions deflect the current upward, and so ventilation is secured without



Sharpe's Ventilating Wall Filter Inlet.

draught. The amount of air can be regulated by means of the adjustable swing front which governs the inlet, or it can be closed entirely. When the ventilating inlet is closed, as regards the room, there is still a current up the pipe.

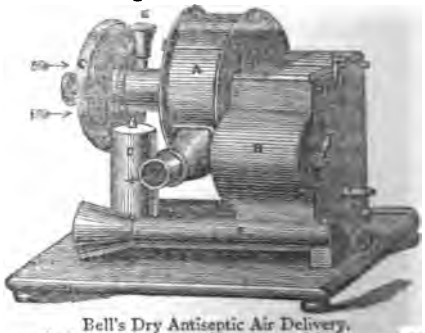
Messrs. Sharpe have also arranged a combined inlet and outlet ventilating arrangement for single and double storeys, and they have here provided, as well as the inlet, some six feet or so up the wall—a description of which I have just given—an outlet, which takes the shape of a funnel or bell-mouth exit into a special shaft running inside or outside the room up to the parapet of roof, where is fixed an ejector of any suitable pattern. The action is as follows: The passage of the wind through the ejector at the roof top causes an upward or exhaust current all through from the inlets. The cold air passes up the tubes, then through the funnel and up to the ejector, and in passing through the funnel causes a vacuum at the broader end, and a rush of the air at the top of the room takes place, thereby clearing the apartment of the upper air. The same ejector will serve for several rooms



Sharpe's Inlet and Outlet Ventilators.

A, inlet; B, funnel-shaped outlet; C, upcast shaft; D, exhaust finial.

Delivery of Dry Medicated Air in Disease.—This is now rendered possible by the invention of Mr. Anthony Bell, and is used instead of operating under the carbolic spray, whilst freeing the air from impurities. In this apparatus a current of air is generated by a fan driven by a clock movement. The air is drawn through a filter composed of two folds of fine gauze, moistened with a twenty to forty per cent. solution of carbolic acid in water. Before passing to the fan the temperature of the air is raised by a spirit lamp, and above this a small receiving vessel is inserted into the tube, having a perforation at the bottom of such a size that when filled with a piece of lint soaked in carbolic solution a drop passes out at regular intervals, and is volatilised upon the warm plate beneath and diffused through the current. From the fan the

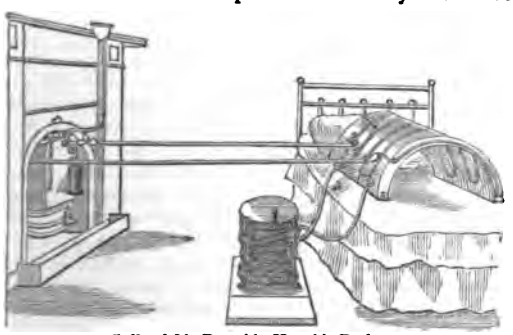


Bell's Dry Antiseptic Air Delivery.

A, fan; B, clock movement; C, filter; D, spirit lamp; E, receiver; F, delivery piece.

current passes by a short tube to a trumpet-shaped delivery piece, and is discharged into the atmosphere of the room. The air that has passed the filter is pure and antiseptic, and free from contamination. The volatilised acid compasses the destruction of all germ life that may be involved in its atmosphere.

Delivery of Hot Air in Disease.—An example of this will be found in the Portable Hot Air Bath invented by Mr. Thomas Galbraith, of Londonderry; and this apparatus is largely used by the medical profession in selected cases of disease. This invention consists of a steam generator connected by a pipe to a steam chamber composed of a hollow casing forming three sides of a square. In the interior of the hollow casing coils of pipes are placed, one end of each being in connection with a bellows or other air-forcing apparatus, whilst their other ends communicate with the space inclosed by the three



Galbraith's Portable Hot Air Bath.

sides of the steam chamber. The air when passing through the coils within the steam-chamber is heated to the desired extent. With the usual arrangement of steam-chamber, the three sides also constitute three sides of the hot-air bath or chamber, the fourth side being the bed whereon the patient is laid, and the ends of the chamber are closed in with blankets or other covering, so as to prevent as much as possible the outward passage of the heated air, which is thus caused to act directly on the part of the patient's body under treatment. The blankets may be so arranged as to cover or envelop the patient's whole body when considered necessary; or the apparatus may be placed in a box and used as a box-bath. The steam, after passing through the steam-chamber, is conducted away from the apparatus by a pipe, and drain taps are also provided to draw off the water of condensation. The boiler is so shaped as to admit of being easily placed in the hollow space over an ordinary house or bed-room fire-grate. Its upper part is provided with a pipe and filler for admitting water, the pipe being fitted with a coupling, for convenience in packing. The feed-pipe being always open to the atmosphere, acts as a safe-guard in case of the safety-valve getting out of order. The height of water in the boiler is regulated by a tap or cock, through which any water above the required level is drawn off; the height of the water in the boiler being shown by a glass water-gauge. From the front part of the boiler a tubular branch projects, fitted with a union, by which a pipe is attached to the boiler as well as the hot-air bath. A bellows, or blowing apparatus for generating a gentle blast of air, forms part of the apparatus, and the nozzle or air-escape orifice of the blowing apparatus is connected by a flexible pipe to either or both orifices of the air-bath, according to the treatment required.

THE

SANITARY RECORD.

SEPTEMBER 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

HOSPITAL ISOLATION.

THE legal proceedings which we record in another place as having been taken by Mr. J. Makinson Fox, in defence of his professional honour as Medical Officer of Health, have at least the merit of novelty. So far as we remember, it is the first case on record of a Health Officer seeking in this way to clear himself from the suspicion of permitting, through neglect of duty, the spreading of infectious disease. In other respects the trial is by no means one of an unusual kind. One person says in a local newspaper some strong things of another; the latter retaliates by bringing an action and asking for substantial damages; and the jury award just enough of damages to carry costs. The case tells its own story sufficiently well without need of exposition on our part, even if this were expedient; but there are certain considerations arising out of the trial on which a word or two of comment may not be out of place.

The defendant in the action, a whilom member of the Local Board of Lymm, virtually alleges, in a lengthy letter to the local paper, that Mr. Fox did not use his influence to secure the isolation in hospital of certain cases of scarlatina that occurred during an outbreak of that disease at Lymm. This we do not understand Mr. Fox to deny; but he argues that there was no power to isolate the cases, and that it was neither safe nor desirable to remove them to the hospital to which Lymm had access (*i.e.*, the Warrington Fever Hospital, five miles off), having regard to the then severely inclement weather. There is, of course, something in this latter contention; but Mr. Fox is known to hold certain peculiar views as to isolation in hospital, about which he speaks in his Annual Reports for 1879 in singularly distrustful terms. Whilst we are prepared to admit that there may often be difficulty in inducing mothers to part with their children who are suffering from infectious disease, yet the undoubted fact remains that when Medical Officers of Health have really set themselves to make infectious hospitals useful, this difficulty, to a large extent, disappears. The particular circumstances of the cases which seem to have inspired Mr. Robson's letter, were not brought out at the trial with sufficient distinctness to justify the formation of any judgment as to the propriety of their compulsory isolation or not; but we must confess to agreeing with the defendant that five children suffering from infectious disease ought not to be

kept in a cottage containing only four rooms, as appears to have been the fact in the case of the Booth family.

It may be hoped that the enquiry which Dr. Thorne Thorne is now actively pursuing on behalf of the Local Government Board into the use and influence of infectious hospitals may tend to clear up some of the mistiness that now seems to overhang the clauses of the Public Health Act which relate to the provision and use of hospitals. It is surprising to find the number of cases in which desirable things are set aside for supposed want of 'power' to do them. And one of the clauses that is most often treated in this way is section 124, which was described by Lord Justice Bramwell at the recent trial as a most embarrassing one. Yet, on the face of it, the clause seems tolerably clear. It enacts that 'any person who is suffering from any dangerous infectious disorder, and is without proper lodging or accommodation, or lodged in a room occupied by more than one family, or is on board any ship or vessel, may be removed by order of any Justice to an infectious hospital'. It is mainly upon the attitude of the Medical Officer of Health and Local Authority that the enforcement, or otherwise, of this section depends. The words 'without proper lodging or accommodation' must surely mean, if they mean anything at all, lodging or accommodation proper, not only for the due treatment of the individual, but for the prevention of the spread of the disease.

This can be the only natural meaning of the words; but legal subtlety has cast doubts upon the reading of the section in this natural sense, and as a consequence we find certain Local Authorities (as Warrington and Oldham) inserting clauses in their Improvement Bills to make the intention of the section clearer. It would be well if some case could be brought before the proper division of the High Court of Justice to test the legality of the new reading of the clause, that 'proper' lodging or accommodation means lodging or accommodation proper only for the patient, without regard to those who surround him. It is certainly a mischievous one from a public health point of view, and weak-kneed Local Authorities will be sure to shelter themselves behind it in asserting that they have no 'power' to do what more vigorous Authorities find no difficulty in doing with a minimum of friction.

The Sowerby Bridge sewerage scheme, designed by Messrs. Utley & Gray, civil engineers, of Halifax and Sowerby Bridge, has now received the approval of the Local Government Board. Mr. Godfrey Rhodes, Solicitor, clerk to the Local Board, has received the official intimation that the plans and estimates were passed, and sanction granted to borrow the amount (£15,143) required to carry out the works, repayable as to the sum of £10,643 in thirty years, and the remaining £4,500 in fifty years. Mr. Hanson's process of treating the sewage has been approved by the Local Government Board in conjunction with this scheme.

NOTES OF THE MONTH.

THE WATER-SUPPLY OF LITTLEHAMPTON.

The foundation stone of the water tower to be erected for supplying water to this town has been laid by the Duke of Norfolk. After many years of discussion, the Local Board, acting under the advice of Messrs. R. B. Grantham and Son, determined to sink two wells and make a boring. The result of these works is that a quantity of water was obtained more than sufficient for the present population. The works remaining to be done for the delivery of the water in the town, namely, the erection of the tower with a service tank to contain about 80,000 gallons, a 15-horse power pumping engine, and the laying of the pipes in the town, are now being proceeded with, and in a few months it is hoped that Littlehampton will possess a regular supply of pure water.

M. PAUL BERT ON SCHOOL HYGIENE.

This celebrated French savant lately presented a prize for history which he himself had founded at the communal school of La Madeleine, Auxerre, and took the opportunity to express his views on school hygiene. School-houses, he said, should be bright and cleanly, and so attractive that only lazy dunces would attempt to play truant. They ought to have large airy school-rooms, with plenty of sunshine pouring into them, and no bars to the windows. Then there should be a fine spacious playground, a gymnasium, and, wherever it was possible, a beautiful flower-garden. The school-house should be ornamented and decorated; it should be the lay church; and Republicans ought to do for it what their forefathers did for the common house of worship. It should be counted a holy place, because there truths susceptible of demonstration, civic virtues and the religion of patriotism, are taught. M. Bert also very sensibly recommended keeping good fires in winter, a change of clothing for every pupil in the schoolhouse, and the provision of basins of hot soup for indigent children—a fair amount of food being necessary to open a child's ears to the voice of the schoolmaster. The value of these recommendations is incontestible; the possibility of carrying them out, less so.

ELECTRICITY AND UNDERGROUND RAILWAYS.

If the eight miles trial of the electric engine in New Jersey, U.S. prove a success, we may hope to see introduced into our metropolitan railways this almost noiseless and quite smokeless motor, which is supplied with motive power from electricity generated at a stationary engine. As these electric stations—of which there need be but a few—can be placed at any convenient spot near the line, and as the engines can be worked on a most economical plan, and the services of the engineers and stokers dispensed with, there will also be some chance of an enhanced dividend to the shareholders. The statistics already published shew that the electric system of locomotion would cost less than half of the present system for working expenses, and it appears that the electric engine, which would traverse the rails, would cost only a third of the present ponderous steam locomotives. But the chief boon to the metropolis would lie not so much in the reduction of the cost of working the underground lines as in the abolition of the seething sulphurous atmosphere now daily endured. There will be no smoke, no cinders, no smell, no risk of fire, absolute punctuality, and greater

guarantee against accidents. We trust that English directors will narrowly watch the experiments in the States, and as soon as may be, introduce some improvement of this kind here, giving us almost a paradise after much purgatorial suffering.

THE POLLUTION OF RIVERS.

The Maidstone Local Board has again had under consideration the question of the serious pollution of the River Medway by the straw mills at Tovil, the consequent poisoning of thousands of fish, and the resulting danger to the public health from the putrefying bodies. It had been decided to call the attention of the Local Government Board to the matter, and to ask that an inspector might be sent down to make a full inquiry, and a reply was read from that body, asking if it was the wish of the authorities to proceed against the offenders under the Rivers Pollution Act (sec. 6), and if so that a formal application should be sent in for power so to do, together with the name of the offenders. The Drainage Committee of the Local Board have recommended that a full inquiry should be made into the actual source, nature, and extent of the pollution, and that special attention should be directed to the point whether, if the polluting liquid were allowed to pass into the public sewer, the drains would be prejudicially affected. This proposal led to great discussion, and it was pointed out that by taking the pollution into the sewer the town would be responsible for damage done below the sewage outfall into the Medway at Allington. Eventually the recommendation was agreed to, it being fully understood that no agreement would be come to with the millowners unless the noxious matters could pass through the sewer without detriment to the pipes, and without throwing any additional responsibility on the town in regard to river pollution. It was intimated, however, that the owners were willing to construct subsiding tanks, in which the pollution matter could be rendered harmless, and thus expensive litigation may be avoided.

SANITARY SCIENCE IN THE SANDWICH ISLANDS.

Honolulu, it seems, rejoices in the possession of a Board of Health, from the report of which we learn that the questions of sewerage and privies are fully discussed, and estimates given to show that the Pail or Rochdale system would be most effective and economical at Honolulu. The agent of the Board of Health reports 638 deaths for the year ending March 31, 1879. Typhoid fever is noted as having caused no more than ordinary mortality among the other races on the island of Hawaii, but as having been so fatal among the natives, as to threaten their extermination at no distant day. This mortality is chiefly ascribed to their refusal to avail themselves of medical aid and care, 311 out of 543 having died without such attendance. An earnest appeal is made by the president of the board, Samuel G. Wilder, to induce the natives to accept the gratuitous provision made for them in the hospital organised by Kamehameha IV and other institutions.

DRIVES FOR INVALIDS.

A correspondent of the *Echo*, Mr. George W. McCree, makes a kindly suggestion on behalf of invalids of the poorer classes. He writes:—'Some thoughtful Americans have invented a new delight for poor sick folk. A Young Men's Christian Association gave 9,082 carriage drives to invalids, and 1,600 car tickets for a similar purpose. Cannot something of this kind be done in London just now? A few pounds sent to our hospitals, to the London City Mission, to good curates or Nonconformist pastors, or any well-known flower mission, would secure pleasant drives to Clapham Common, Hampstead Heath, Regent's Park, Victoria Park, and various other pleasant resorts in and about London, for hundreds of humble women and pale-faced girls, who have to toil long hours for a scanty wage, and pine for fresh air and natural beauty.' The American example shows that such a plan is practicable; and we commend the notion to some of the societies which turn their attention to brightening the lives of the poor; the National Health and Kyrle Societies for instance.

HOUSE PLUMBING.

The New York Board of Health have promulgated some rules which are sufficiently novel on this side of the Atlantic, and we would like the opinion of our practical readers thereon. The recommended enforcements enjoin the use of cast iron soil-pipes, and the same material for the sewer-pipes, *i.e.* drain-pipes. It is also stipulated that the drain-pipes be above the cellar-floor, and not buried in any way—the caulking to the joints being of lead or sal ammoniac and iron filings. How would the introduction of such rules suit this country? It is common enough to use iron drains inside the house, but would they not 'scale' unless treated by an oxydising preventive process, such as Barff's or Bower's? Above all, would it be feasible to display the drains openly like hot-water pipes, and would it conduce to obtaining a good fall in the case of long basements?

UNAUTHORISED WORKS.

The Hexham Local Board having recently carried out works for increasing the yield of water to the town, without obtaining the sanction of the Local Government Board either as to the outlay or the scheme, the latter authority has now asked to be furnished with plans, sections, statements of expenditure, etc. As it has required long continued action on the part of a ratepayer in order to bring about this result, it is fit matter for speculation, whether any steps in this direction could, or would have been taken by the Local Government Board on its own initiative, *i.e.*, in the absence of a complaint from an aggrieved resident. In the present case, the matter no doubt will be fully investigated, in virtue of section 299 of the Public Health Act, but it would be more satisfactory if the Local Government Board were enabled to act without such prompting, which is more likely than not to bring down local abuse upon those who may thus intervene.

THE VALUE OF HEALTH.

The Ashford Local Board recently appointed Dr. Wiglesworth, of Hamstreet, a village near that town, Medical Officer of Health for their district, comprising a population of 10,000, at a salary of £25 per annum, which is at the rate of a fraction above a halfpenny per soul. The Local Government Board refused to sanction the appointment for such a salary, but the Ashford Authority have now appointed Mr. Philip Phelps, another local surgeon, at the same stipend, after a proposition that the salary should be £15. It now remains to be seen what further steps will be taken by the Central Authority.

AGRICULTURAL SCIENCE AT SOUTH KENSINGTON.

A class of sixty selected Science teachers have been undergoing training at South Kensington, and recently receiving lectures from Prof. Tanner, and practical demonstrations bearing upon these lectures, with very successful results. By the kindness of Mr. G. M. Allender, the whole party were recently permitted to visit the Aylesbury Dairy Company's premises and dairies, and to receive practical demonstrations of the most improved methods of butter-making, storage, receiving and distributing milk, and general dairying operations, together with explanations of the most improved dairy appliances. The instruction thus given has been very successful, and the whole class have shown the utmost interest in their work, and the examination papers have shown that they have thoroughly profited by the instruction afforded.

BUXTON.

A correspondent writes as follows:—'Can any of your readers give any information as to the alterations that are being made to the Charitable Hydropathic Institution at Buxton: I passed through the place about a fortnight ago, and above the old roof, I found that the iron girder work of an immense dome is being built up; it looked to me more like the dome of an Exhibition building than the roof of a Charitable Hospital. It may be interesting to know what alterations are intended? what they will cost? and how the money is to be obtained? At a time like the present, when both landowners and tenants are bewailing their fate, and when so many charitable institutions are crying out for help, Buxton is indeed to be envied, if it can find the money which must be necessary to defray the cost of the embellishments and alterations to which I have referred.'

THE PUBLIC HEALTH

DURING AUGUST 1880.

THE mean temperature during August at the Royal Observatory, Greenwich, was 62°.8, against 62°.7 and 59°.9 in the corresponding months of 1878 and 1879; it was 2.°0 in excess of the average August temperature at Greenwich in 100 years. An excess of temperature prevailed on twenty of the thirty-one days of the month; and the daily mean ranged from 55°.3 on the 1st, to 68°.3 on the 28th. Rain was measured at Greenwich on but five days during the month, to the aggregate amount of one inch; the average August rainfall in sixty-one years is 2.4 inches. The rainfall last month was therefore less than half the average amount, and was smaller than in any corresponding month since 1871. The sun was above the horizon during 449.1 hours in August, but only 106.3 hours of bright sunshine were recorded; this was very considerably below the average, as the mean amount of bright sunshine in August of the three years 1877-8-9 was 152.6 hours. The recorded amount of bright sunshine during last month was very considerably smaller than that recorded in any of the five preceding months; even in March 141 hours of bright sunshine were registered. Westerly and south-westerly winds mostly prevailed during the first ten days of the month, whereas the wind was almost continually in the north-east during the remainder of the month.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing an estimated population of about seven-and-half millions of persons, or nearly a third of the entire population of England and Wales 20,337 births and 14,091 deaths were registered during the four weeks ending 28th August last. The births were equal to an annual rate of 35.4 per 1,000 of the estimated population in the twenty towns; it was 35.2 in London and 35.6 in the nineteen provincial towns, and ranged from 28.9 and 29.6 in Brighton and Plymouth, to 39.6 and 40.0 in Hull and Leicester.

The mean annual death-rate during the four weeks of August was equal to 24.5 per 1,000, whereas in the two preceding months it had been so low as 19.1 and 20.8. The average August death-rates in the twenty towns were 22.2, 26.5, and 18.1, respectively, during the three years 1877-8-9. The marked increase in the English urban death-rate during last month was entirely due to excessive diarrhœa fatality. In 1877 and 1879 the August temperature was considerably below the average, inducing comparative freedom from epidemic diarrhœa. It may be noted, however, that notwithstanding an equally high temperature, and less than a fifth of the rainfall, the rate of mortality last month was very considerably less than that recorded in August 1878.

The lowest annual rate of mortality in the twenty towns during August, was 16.9 in Bristol. The rates in the other towns, ranged in order from the lowest, were as follow: Portsmouth, 20.9; Wolverhampton, 20.9; Brighton, 21.6; Bradford, 21.8; Oldham, 22.3; London, 22.6; Newcastle-upon-Tyne, 23.1; Birmingham, 25.4; Norwich, 26.1; Sheffield, 26.4; Plymouth, 26.4; Sunderland, 26.8; Leeds, 27.0; Nottingham, 27.0; Hull, 29.2; Liverpool, 29.6; Manchester, 29.8; Leicester, 31.3; and the highest rate during the month was 33.6 in the borough of Salford. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death rate during August averaged 26.3 per 1,000, while in London it did not exceed 22.6. The high death-rates in most of these towns was due to exceptional diarrhœa fatality.

The 14,091 deaths from all causes in the twenty towns last month included 4,471 which were referred to the seven principal zymotic diseases; of these, 3,341 resulted from diarrhœa, 421 from scarlet fever, 278 from whooping-cough, 184 from measles, 172 from fever, 60 from diphtheria, and 15 from small-pox. These 4,471 deaths were equal to an annual rate of 7.8 per 1,000 in the twenty towns during the four weeks under notice, against 3.0 and 4.5 in the two preceding months. The zymotic death-rate did not exceed 6.4 per 1,000 in London, but averaged 9.1 in the nineteen provincial towns; this excess in the provincial towns was entirely due to greater diarrhœa fatality. The annual death-rate from these seven diseases during August did not exceed 3.8 in Bristol and 4.8 in Wolverhampton; it ranged upwards, however, in the other towns to 10.6 both in Sheffield and Hull, 13.6 in Salford, and 17.3 in Leicester. The annual death-rate from diarrhœa (mainly of infants under one year of age) averaged 5.8 per 1,000 during August in the twenty large towns, against 2.4 in the preceding month; the rate was equal to 4.4 in London, and 7.1 in the nineteen large provincial towns. The rate from diarrhœa last month did not exceed 2.4 and 2.5 in Bristol and

Oldham, whereas it ranged upwards to 9.2 in Sheffield and Hull, 10.1 in Salford, and 14.1 in Leicester. The deaths referred to diarrhœa in these twenty towns in the corresponding four weeks of 1878 and 1879, were respectively, 2,986 and 952; the 3,341 fatal cases in the four weeks of August last showed, therefore, a marked excess not only upon the low number in the cold August of 1879, but also upon that returned in the same period of 1878. The 421 deaths from scarlet fever last month showed a further decline from the numbers returned in recent months; the largest proportional fatality of this disease occurred in Sunderland and Norwich. The deaths from measles were again proportionally more numerous in London than in the nineteen provincial towns. Whooping-cough showed the largest fatality in Liverpool and Hull. The 60 deaths from diphtheria exceeded those in the previous month by 3, and included 40 in London, 7 in Manchester and Salford, and 3 each in Plymouth, Birmingham, and Leicester. The 172 deaths referred to fever, mainly enteric, included 76 in London and 96 in the nineteen provincial towns, which have a population nearly equal to that of the metropolis; the most excessive death-rate from fever in August occurred in Plymouth, Salford, Portsmouth, and Sheffield. Small-pox caused 15 more deaths in London, but not one in any of the nineteen other large towns; the deaths from small-pox in London in the two preceding weeks were 51 and 14 respectively. The number of small-pox patients in the metropolitan asylum hospitals, which had been 218 and 178 at the end of June and July, had further declined to 128 on 28th August. The average weekly numbers of new cases of small-pox, which had been 41 in June and 21 in July, was 23 during the four weeks of August. This slight increase in the new cases during August, marks an interruption of the recent steady decline in the prevalence of small-pox in London.

The fatality of diseases of the respiratory organs showed a further decline during August. The weekly number of deaths referred to these diseases in London, which had steadily decreased in the five preceding months from 254 in March, to 177 in July, further fell to 155 in August, but exceeded the corrected weekly average for the corresponding period in the ten years, 1870-9; they were equal to an annual rate of 2.2 per 1,000. The annual death-rate from lung diseases during August ranged in those of the nineteen large provincial towns for which the information is available, from 1.1, 1.7, and 1.8 in Portsmouth, Plymouth, and Newcastle-upon-Tyne, to 3.7 in Sunderland, and 4.0 both in Salford and Sheffield.

In the outer ring of suburban districts round London (having a population of little less than a million persons) the annual death-rate from all causes during August did not exceed 18.7 per 1,000; the zymotic death-rate was, however, equal to 5.7 per 1,000, and was little less than that which prevailed in inner or registration London, where the rates from all causes and from the seven zymotic diseases were, as before stated, 22.6 and 6.4 per 1,000 respectively.

In the accompanying table we are able, through the co-operation of the Medical Officers of Health, to publish uniform August mortality statistics for 192 urban sanitary districts. The number of contributing sanitary districts had steadily increased during the preceding thirteen months from 36 to 188. On the last day of August, 216 post-cards were sent out to the Medical Officers of Health of as many sanitary districts, including 19 new applications. Of these 216 cards, so many as 189 have been returned, and the statistical information thereon furnished is herewith published. The estimated population of the 192 sanitary districts for which we publish August statistics in the accompanying table, is about seven and a quarter millions of persons; and, including London and its outer ring of suburban districts, the aggregate population is nearly twelve millions, and little short of half the population of England and Wales. The birth-rate in those districts furnishing the information averaged 34.7 per 1,000, against 37.7 and 34.8 in the two preceding months; it was exceptionally low last month in Warminster, Saffron Walden, Weston-super-Mare, Littlehampton, and Beccles. On the other hand, the birth-rate was excessively high, and exceeded 50 per 1,000 (suggesting an under-estimate of the population) in Altrincham, Walker-on-Tyne, Warrington, Harwich, and Wombwell.

The annual death-rate during August averaged 24.4 per 1,000 of the estimated population in the 192 urban sanitary districts, showing a marked increase upon the rates that prevailed in the two preceding months, which were but 18.9 and 18.7. The average death-rate during last month in the twenty large towns, including London, was, as before stated, 24.5 per 1,000; the rate during last month, in the 172 small towns, differed, therefore, but slightly from that in the larger towns, their general increase upon recent monthly rates being mainly due, as in the larger towns, to excessive diarrhœa fatality. The August death-rates were remarkably low, and under 10 per 1,000, in Littlehampton, Harwich, Warminster, Maidenhead, Newark, Trowbridge, Redditch, Toxteth Park, Pontypool, and Saffron Walden. The most excessive rates (those over 34 per 1,000) occurred in Redruth, York, Ashton-under-Lyne, Ilkeston, and Preston. The annual death-rate from the seven principal zymotic diseases in the sanitary districts averaged 7.8 per 1,000, against 2.6 and 3.4 in the two preceding months, and corresponding with the rate in the twenty larger towns. With very few exceptions, the increase in the zymotic death-rate was entirely due to the fatal prevalence of diarrhœa. In 19 of the 192 sanitary districts no death from any of the seven principal zymotic diseases was recorded, while the largest proportional excess in the rate from those diseases occurred in Altrincham, Bradford (Lancashire), Braintree, Ilkeston, Luton, Preston, Runcorn, Widnes, Willenhall, and York. A fatal case each in Cardiff and Huddersfield were the only deaths from small-pox reported in the 192 sanitary districts. Measles showed somewhat fatal prevalence in Hyde, Merthyr Tydfil, and Middlesbrough; and scarlet fever in Altrincham, Bolton, Bootle-cum-Linacre, Colchester, Reading, and Willenhall. Diphtheria caused three deaths in Aston, and two both in Burton-upon-Trent, and Leamington. Fever, principally enteric, showed the highest death-rates in Coseley, Crompton, Gloucester, Ilkeston, Lincoln, and Tredegar.

The annual death-rate from diarrhœa during August, which averaged 5.8 per 1,000 in the twenty large towns, including London, was equal to 6.0 in the 172 smaller urban sanitary districts contributing statistics to our table. Diarrhœa fatality in the smaller towns showed the largest excess last month in Barnsley, Bradford (Lancashire), Coventry, Goole, Luton, Penzance, Preston, Runcorn, Widnes, and York; the annual rate from this disease in each of these towns exceeded 10 per 1,000, and was equal to 16 per 1,000 in York.

The annual death-rate from diseases of the respi-

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,664,149	9,881	6348	2423	1065	*	*	*	976	1806	15	103	210	40	112	76	1250	618	544	214	1014	35.2	22.6	6.4	2.2	
ABINGDON	6,033	14	6	2	..	..	..	1	3	..	..	..	..	..	..	..	..	1	..	..	..	27.3	11.7	0.0	2.0	W. T. G. Woodforde, M.D.
ACTON	16,000	52	27	14	2	1	3	2	5	6	..	..	..	..	..	..	6	..	3	..	..	38.3	19.9	4.4	0.0	T. Francis.
ALTRINCHAM	12,000	51	25	9	7	2	1	3	3	15	..	..	5	..	..	..	10	1	1	..	1	50.0	24.5	14.7	1.0	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	124	104	38	21	5	2	21	17	30	..	..	6	1	1	..	22	7	10	..	14	43.7	36.6	10.6	2.5	W. H. Hughes.
ASTON MANOR	52,821	175	94	47	12	4	3	15	13	31	..	..	1	3	2	..	25	7	7	1	..	39.0	21.0	6.9	1.6	H. May.
AUDENSHAW	6,000	25	10	4	3	..	1	..	2	3	..	..	..	..	1	1	1	..	..	..	..	49.0	19.6	5.9	0.0	R. Slater.
BANBURY†	13,500	*	13	3	2	..	1	3	4	2	..	..	1	..	..	..	1	..	..	..	..	*	12.5	1.9	0.0	R. Grimbly.
BANGOR	7,835	*	11	1	1	1	4	1	3	..	..	..	..	..	..	..	..	2	2	1	..	*	16.5	0.0	3.0	H. Rees.
BARNSLEY	30,000	109	85	34	21	*	*	*	13	34	..	1	..	..	3	..	29	6	8	5	8	42.8	33.4	13.3	2.4	M. T. Sadler, B.A., M.D.
BARROW-IN-FURNESS	40,000	146	83	37	21	5	8	8	4	23	..	..	1	..	4	1	17	5	8	2	..	43.0	24.4	6.8	1.5	J. Settle.
BATH†	53,649	98	56	10	2	3	4	20	17	5	..	..	..	..	1	1	3	4	5	2	6	23.8	13.6	1.2	1.0	A. B. Brabazon, M.D.
BATLEY	29,851	75	38	17	11	..	2	4	4	13	..	..	..	..	1	1	11	4	4	..	..	29.6	15.0	5.1	1.6	W. Bayldon.
BECCLES	5,000	8	14	5	..	2	..	4	3	2	..	..	..	..	1	..	1	..	3	..	..	18.8	32.9	4.7	0.0	E. B. Crowfoot, M.B.
BILSTON	25,000	63	38	15	6	3	..	8	6	9	..	..	4	..	..	2	3	4	..	1	..	29.7	17.9	4.2	1.9	W. M. Hancox.
BINGLEY	9,000	20	11	3	2	..	1	2	3	..	..	..	..	..	..	..	..	1	1	..	..	26.2	14.4	0.0	1.3	J. W. Craig, M.D.
BIRMINGHAM	394,738	1131	763	394	139	29	24	120	87	319	..	2	18	3	11	3	278	60	50	22	54	37.3	25.2	10.5	2.0	A. Hill, M.D.
BISLEY	5,264	14	11	4	1	..	1	1	4	..	..	..	..	..	..	..	..	1	1	..	..	31.3	24.6	0.0	2.2	T. Partridge.
BOLTON†	106,500	271	174	67	38	17	12	23	17	77	..	2	15	..	1	..	59	12	12	3	..	33.2	21.3	9.4	1.5	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	69	26	25	3	4	9	2	29	..	1	6	..	5	1	16	5	6	4	1	*	28.8	12.1	2.1	R. J. Sprakeling.
BOSTON‡	15,000	60	23	7	1	2	2	6	5	1	..	..	1	..	..	..	..	5	2	1	5	41.7	16.0	0.7	3.5	W. Clegg.
BRADFORD (LANC.)†	15,000	57	35	10	13	..	1	5	6	17	..	..	1	..	..	..	16	2	2	..	..	49.5	30.4	14.8	1.7	J. Hudson.
BRADFORD (YORKS.)†	197,196	481	329	116	*	*	*	*	42	94	..	5	18	1	7	6	57	*	*	8	18	31.8	21.8	6.2	*	———
BRAINTREE	5,000	*	10	5	1	..	1	2	1	6	..	..	..	..	..	..	6	..	1	..	..	*	23.5	14.1	0.0	J. Harrison.
BRENTFORD	11,557	30	18	7	2	..	..	3	6	8	..	..	1	..	..	..	7	..	1	..	..	30.5	18.3	8.1	0.0	J. Williams.
BRIDGNORTH	6,000	14	10	2	2	1	..	2	3	3	..	1	..	..	..	..	2	2	..	..	..	27.5	19.6	5.9	3.9	A. Mathias.
BRIDGWATER	13,000	46	25	5	2	2	2	3	11	2	..	..	..	..	..	..	2	..	4	1	3	41.7	22.6	1.8	0.0	F. J. C. Parsons.
BRIDPORT	8,145	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. M. Evans.
BRIGHTON†	107,321	238	178	72	*	*	*	*	30	49	..	..	6	..	1	1	41	*	*	5	27	28.9	21.6	6.0	*	———
BRISTOL†	213,536	553	277	93	*	*	*	*	59	62	..	2	14	..	4	3	39	*	*	9	42	33.8	16.9	3.8	*	———
BROMLEY (KENT)†	14,293	*	15	4	2	2	..	4	3	4	..	..	..	..	..	..	4	..	1	..	..	*	13.7	3.6	0.0	C. O. Baylis, M.D.
BROMSGROVE	6,967	16	10	1	2	..	1	2	4	2	..	..	..	..	..	..	2	1	1	..	..	27.0	16.9	3.4	1.7	C. Carey.
BURNLEY	56,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. Dean, M.D.
BURSLEM	29,159	85	72	26	15	3	1	8	19	18	..	..	..	..	3	..	15	7	4	..	..	34.3	29.1	7.3	2.8	J. M. Taylor.
BURTON-UPON-TRENT	33,000	137	76	34	10	2	5	16	8	20	..	..	..	2	..	1	17	4	3	4	6	48.9	27.1	7.1	1.4	C. Perks.
BURY†	50,000	128	91	28	20	*	*	*	16	23	..	..	4	..	4	2	13	18	11	1	..	33.4	23.7	5.8	4.7	H. Ashworth.
BURY ST. EDMUNDS	15,600	43	32	7	6	..	1	8	10	5	..	..	..	..	1	..	4	1	6	1	5	32.5	24.2	3.8	0.8	F. W. Clarke.
CAMBORNE	15,000	*	20	9	1	..	..	5	5	1	..	..	..	..	..	..	1	1	2	..	..	*	15.7	0.8	0.8	E. S. Angove.
CAMBRIDGE	34,300	105	66	23	15	4	4	9	14	24	..	1	..	..	..	2	21	3	7	2	6	35.8	22.5	8.2	1.0	B. Anningson, M.D.
CANTERBURY‡	26,964	74	14	12	4	1	2	5	11	8	..	1	..	..	1	1	6	5	3	2	5	16.8	16.9	4.0	2.5	F. Wacher.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
CARDIFF	82,364	195	148	53	25	3	8	41	18	39	1	1	1	1	2	1	32	14	17	9	17	27.9	21.2	5.6	2.0	H. J. Paine, M.D.
CARLISLE‡	35,000	116	77	25	17	3	3	17	42	18	..	..	1	..	5	1	11	6	6	4	5	34.6	22.9	5.4	1.8	R. Elliott, M.D.
CARNARVON	10,407	17	18	3	2	1	1	6	4	..	..	..	..	..	..	..	..	4	1	..	..	19.2	20.4	0.0	4.5	H. Rees.
CHELMSFORD	9,700	27	12	4	1	..	..	3	4	1	..	..	..	..	..	..	1	2	..	..	2	32.8	14.6	1.2	2.4	E. H. Carter.
CHELTENHAM†	45,000	81	77	30	3	3	1	10	30	10	..	..	..	..	..	..	10	4	2	2	7	23.5	22.3	2.9	1.2	T. Wright, M.D.
CHISWICK	12,000	49	17	9	1	..	..	2	5	3	..	..	..	..	..	..	3	2	2	..	..	48.1	16.7	2.9	2.0	F. C. Dodsworth.
CIRENCESTER	7,000	*	7	2	..	1	1	..	3	..	..	..	..	..	..	..	..	1	..	1	1	*	11.8	0.0	1.7	F. T. Bond, M.D.
CLECKHEATON	9,250	32	15	6	1	2	..	4	2	3	..	..	..	..	..	..	3	3	1	1	..	40.7	19.1	3.8	3.8	H. O. Steele.
COCKERMOUTH†	5,550	*	9	1	2	1	..	3	2	..	..	..	..	..	..	..	..	1	..	1	3	*	21.8	0.0	2.4	J. Ward, M.D.
COLCHESTER	28,924	71	61	30	11	2	3	7	8	24	..	..	10	..	..	1	13	7	2	2	5	28.9	24.8	9.8	2.8	E. Waylen.
CONGLETON†	12,000	28	15	5	1	1	1	5	2	1	..	..	..	..	..	..	1	2	2	2	..	30.4	16.3	1.1	2.2	P. M. Davidson.
CONSETT†	7,868	19	11	5	2	1	..	3	..	3	..	2	..	..	..	..	1	3	..	..	..	31.5	18.2	5.0	5.0	W. M. Renton, M.D.
COSELEY‡	23,000	78	37	9	6	2	3	9	8	7	..	1	..	..	..	3	3	4	1	5	..	35.5	16.8	3.2	1.8	J. Eagleton.
COVENTRY†	41,000	124	96	46	15	..	5	11	19	43	..	..	..	1	..	..	42	2	4	..	9	39.4	30.5	13.7	0.6	M. A. Fenton, M.D.
COWPEN	5,000	14	12	7	1	1	..	2	1	2	..	..	1	..	..	..	1	2	..	..	..	32.9	28.2	4.7	4.7	H. D. Ward, M.D.
CROMPTON†	10,000	29	16	7	3	1	1	3	1	5	..	..	..	..	..	2	3	1	1	1	..	37.8	20.9	6.5	1.3	W. Brooke, M.D.
CROYDON	71,000	198	103	41	20	4	4	16	18	33	..	2	4	..	2	1	24	2	7	1	11	32.8	17.1	5.5	0.3	C. W. Philpot, M.D., B.Sc.
DAWLISH	3,838	*	4	..	1	..	..	1	2	1	..	..	..	..	..	..	1	..	..	..	..	*	12.3	3.1	0.0	L. Armstrong.
DERBY	80,385	212	144	43	32	6	11	25	27	47	..	7	2	..	..	..	33	9	8	2	12	31.1	21.1	6.9	1.3	W. Iliffe.
DEVONPORT†	50,000	143	77	31	10	3	2	15	16	30	..	1	3	1	2	..	23	5	2	1	9	37.3	20.1	7.8	1.3	J. May, jun.
DORCHESTER	7,500	15	15	6	1	..	1	4	3	..	..	..	..	..	..	..	..	..	1	..	2	23.5	23.5	0.0	0.0	E. J. Day.
DOVER	33,636	85	53	20	7	2	5	7	12	12	..	..	..	1	1	..	10	5	2	3	6	29.8	18.6	4.2	1.8	M. K. Robinson, M.D.
DROITWICH	3,600	11	4	..	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	1	35.9	13.1	0.0	0.0	H. Swete, M.D., S.Sc.C. Camb.
DROYLSDEN	8,000	21	8	1	2	1	1	1	2	1	..	..	..	..	..	..	1	..	1	..	..	30.9	11.8	1.5	0.0	R. Slater.
EASTBOURNE	18,000	*	47	28	8	..	..	4	7	16	..	2	..	..	2	..	12	5	..	..	..	*	30.7	10.5	3.3	E. F. Fussell,† M.B.
EAST DEREHAM	5,791	10	5	3	1	..	..	..	1	1	..	..	1	..	..	..	..	..	..	..	..	20.3	10.2	2.0	0.0	H. B. Vincent.
EPSOM	7,550	*	11	1	2	..	..	3	5	1	..	..	..	..	..	..	1	1	1	..	..	*	17.2	1.6	1.6	E. L. Jacob.
EVESHAM	4,888	*	5	1	2	..	1	..	1	1	..	..	..	..	..	1	..	..	..	..	..	*	12.0	2.4	0.0	G.H.Fosbroke,jun.,S.Sc.C.Cam.
FAILSWORTH	8,000	*	9	3	3	..	..	1	2	2	..	..	..	..	..	..	2	4	1	..	..	*	13.3	2.9	5.9	G. W. Beattie, M.D.
FARNHAM	5,000	16	13	3	..	..	1	5	4	3	..	..	..	..	..	..	3	3	2	..	3	37.6	30.6	7.1	7.1	S. G. Sloman, jun.
FENTON	14,000	56	30	13	3	1	1	5	7	10	..	..	..	..	..	..	10	4	2	..	..	47.1	25.2	8.4	3.4	A. V. Griffiths.
FINCHLEY†	11,339	30	16	6	3	..	1	2	3	1	..	..	..	..	..	..	1	..	..	..	..	34.5	18.4	1.1	0.0	J. Turle, M.D.
FLEETWOOD	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Porter.
GARSTON†	8,500	29	16	8	2	..	..	5	1	5	..	..	..	..	2	..	3	1	..	..	..	44.5	24.5	7.7	1.5	J. A. Fisher.
GLOSSOP	18,697	50	30	7	6	1	3	7	6	5	..	1	3	..	..	1	..	4	5	..	..	31.5	18.9	3.1	2.5	J. Rhodes.
GLOUCESTER	37,907	124	71	24	12	2	6	12	15	21	..	1	..	..	1	5	14	3	1	2	10	38.5	22.1	6.5	0.9	J. P. Wilton.
GOOLE	10,205	33	29	11	4	..	2	8	4	12	..	..	..	..	..	1	11	4	..	2	1	38.1	33.4	13.8	4.6	J. Mitchell Wilson,M.B.,S.Sc.C.
GORTON†	32,000	94	57	23	13	2	3	10	6	14	..	..	4	1	2	..	7	1	5	..	..	38.3	23.2	5.7	0.4	R. E. Hammond.
GREAT DRIFFIELD	6,033	12	11	5	2	1	..	..	3	7	..	..	2	..	..	..	5	2	..	..	..	23.4	21.5	13.7	3.9	D. Ridpath, M.D.
GUILDFORD	10,167	19	10	..	1	..	1	3	5	..	..	..	..	..	..	..	..	..	1	1	..	22.0	11.6	0.0	0.0	J. Morton, M.B.
HALIFAX†	72,000	192	118	26	25	*	*	*	20	5	..	1	..	..	..	..	4	20	13	5	19	34.8	21.4	0.9	3.6	D. Ainley.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1880—(*Continued.*)

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
HARBORNE	6,000	22	8	3	..	..	1	..	4	2	..	..	..	..	..	..	2	..	1	..	1	43.1	15.7	3.9	0.0	R. W. Smith, M.D.
HARWICH†	7,100	29	8	4	..	1	..	..	3	1	..	..	..	..	..	1	..	..	..	..	..	53.2	14.7	1.8	0.0	A. K. Morgan.
HASLINGDEN†	14,000	34	14	5	1	..	1	4	3	6	..	..	..	..	..	1	5	1	..	2	..	31.7	13.0	5.6	0.0	J. A. Harrison, M.D.
HEYWOOD	23,000	*	32	10	10	1	2	4	5	8	..	1	..	..	..	..	7	..	1	..	..	*	16.4	4.1	0.0	H. Wisken.
HINCKLEY	7,500	19	13	3	2	..	..	2	6	1	..	..	..	..	..	1	..	3	..	..	..	29.8	20.4	1.6	4.7	W. H. Griffiths.
HINDLEY	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
HORWICH	4,315	12	2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	32.8	5.5	0.0	2.7	G. H. Whitaker.
HUDDERSFIELD†	81,780	229	134	44	23	6	9	28	24	22	1	3	2	..	2	..	14	16	13	5	16	36.5	21.4	3.5	2.6	J. S. Cameron, M.D., B.Sc.
HULL†	149,627	454	335	154	*	*	*	*	48	122	..	1	1	1	12	2	105	*	*	8	22	39.6	29.2	10.6	*	———
HURST	7,000	18	9	1	2	1	..	1	4	2	..	..	2	..	..	..	..	1	1	..	..	30.3	15.1	3.4	1.7	T. Cooke.
HYDE	28,218	80	57	20	10	6	7	5	9	14	..	9	1	1	..	2	1	6	..	..	..	33.4	23.8	5.8	2.5	J. Nield Cooper.
ILFRACOMBE	5,500	16	6	1	1	..	..	1	3	..	..	..	..	..	..	..	..	1	..	..	..	34.3	12.8	0.0	2.1	E. J. Slade-King, M.D., S.Sc.C.
ILKESTON†	12,356	41	35	18	9	2	2	1	3	15	..	1	..	..	1	4	9	1	..	1	..	43.2	36.9	15.8	1.1	R. Wood.
IPSWICH	48,001	121	91	36	18	3	3	10	21	37	..	..	..	1	2	..	34	4	5	1	9	29.7	22.3	9.1	1.0	G. S. Elliston.
KEIGHLEY	24,000	69	49	18	7	1	3	6	14	3	..	..	..	..	..	..	3	13	2	..	2	33.9	24.0	1.5	6.4	A. Roberts.
LEAMINGTON	24,500	52	45	8	7	5	2	10	13	15	..	..	2	2	..	1	10	..	6	1	1	25.0	21.6	7.2	0.0	J. S. Baly.
LEEDS†	318,929	845	659	286	132	*	*	*	82	13	..	1	4	..	5	8	195	55	36	27	29	34.5	26.9	8.7	2.2	G. Goldie.
LEEK	12,527	44	24	9	3	1	2	5	4	3	..	2	1	..	..	..	..	2	2	..	1	41.4	22.6	2.8	1.9	J. J. Ritchie.
LEICESTER†	129,912	308	312	167	*	*	*	*	23	172	...	13	10	3	1	5	140	*	3	6	12	40.0	31.3	17.3	*	———
LEIGH	20,600	65	46	24	12	1	1	6	2	20	..	..	1	..	1	1	17	3	1	1	..	37.1	26.3	11.4	1.7	J. Hall.
LICHFIELD	8,129	24	10	2	1	..	..	4	3	..	..	..	..	..	..	..	..	1	2	..	..	34.8	14.5	0.0	1.4	G. A. Carter, M.D.
LINCOLN‡	32,103	138	96	42	20	4	3	12	15	37	..	..	5	..	8	4	20	1	5	..	10	44.8	31.2	12.0	0.3	C. Harrison, M.D., S.Sc.C.C.
LITTLEHAMPTON	4,000	6	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17.6	2.9	0.0	0.0	C. Kelly, M.D.
LIVERPOOL†	544,056	1555	1236	502	257	50	46	249	132	402	..	9	20	1	73	15	284	148	93	38	120	37.3	29.6	9.6	3.5	J. S. Taylor, M.D.
LIVERSEDGE	13,750	33	30	9	6	..	2	9	4	5	..	..	..	..	..	..	5	1	2	1	..	28.3	25.7	4.3	0.9	W. J. Sykes, M.D.
LOUTH	10,750	20	19	4	1	2	..	6	6	4	..	1	1	..	..	..	2	5	2	..	..	21.9	20.8	4.4	5.5	R. Domenichetti, M.D.
LUTON	24,200	79	57	35	6	2	1	8	5	29	..	..	..	..	..	..	29	2	5	..	4	38.4	27.7	14.1	1.0	H. Sworder.
LYTHAM	5,000	14	10	2	1	..	..	2	5	1	..	..	..	..	..	..	1	3	..	..	..	32.9	23.5	2.4	7.1	W. E. Pountney, M.B.
MACCLESFIELD	36,641	90	88	21	9	2	6	21	29	11	..	..	1	..	..	..	10	7	7	2	9	28.9	28.3	3.5	2.2	G. Bland.
MAIDENHEAD	8,281	19	5	1	..	..	..	3	1	1	..	..	..	..	..	..	1	..	2	..	1	27.0	7.1	1.4	0.0	W. T. G. Woodforde, M.D.
MAIDSTONE†	29,537	65	49	21	6	4	2	8	8	10	..	..	1	..	..	..	9	2	6	1	..	28.7	21.6	4.4	0.9	M. A. Adams.
MANCHESTER†	363,130	932	830	289	*	*	*	*	91	261	..	18	20	4	13	8	198	*	*	23	118	33.5	29.8	9.4	*	———
MERTHYR TYDFIL†	52,000	154	77	19	18	7	6	13	14	11	..	8	..	..	1	1	1	16	5	..	1	38.6	19.3	2.8	4.0	T. J. Dyke.
MEXBOROUGH	6,000	18	8	1	3	1	..	2	1	3	..	..	..	..	..	..	3	1	..	..	..	35.3	15.7	5.9	2.0	W. Sykes.
MIDDLESBROUGH	58,988	181	134	49	43	8	5	18	11	44	..	10	3	..	6	2	23	14	11	6	5	36.1	26.7	8.8	2.8	J. A. Malcomson, M.D.
MIDDLETON and TONGE†	16,700	29	30	7	7	2	..	4	10	6	..	..	..	..	1	..	5	2	2	..	..	22.6	23.4	4.7	1.6	T. B. Knott.
MIRFIELD	12,725	37	18	5	3	..	2	6	2	..	..	..	..	..	..	..	..	..	4	1	..	34.2	16.7	0.0	0.0	W. Marsden.
MORLEY	12,100	43	21	10	6	2	..	2	1	8	..	..	2	..	..	2	4	..	2	..	..	41.8	20.4	7.8	0.0	S. T. Steele, S.Sc.C.Camb.
MOSS-SIDE†	16,500	33	17	8	2	..	..	4	3	6	..	1	..	..	..	..	5	1	1	1	..	26.1	13.4	4.7	0.8	A. E. Sutcliffe.
NEATH	12,000	33	12	4	2	3	1	..	*	5	..	*	..	..	..	1	..	..	2	..	..	32.4	11.8	4.9	0.0	G. Ryding, M.D.
NEWARK†	13,746	40	9	2	..	1	..	2	4	1	..	..	..	..	..	..	1	2	1	..	..	38.0	8.5	0.9	1.9	A. Aahby, M.B.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Newbury	9,796	21	17	5	2	1	1	5	3	4	..	..	2	..	1	..	1	1	4	..	3	25.2	20.4	4.8	1.2	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	64	41	13	8	2	1	12	5	8	..	..	1	..	..	1	6	6	2	..	..	41.9	26.8	5.2	3.9	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	404	264	100	37	*	*	*	39	62	..	1	7	..	5	2	47	21	20	16	24	35.3	23.0	5.4	1.8	H. E. Armstrong.
Norwich†	85,827	205	172	79	*	*	*	*	32	69	..	1	15	..	5	3	45	*	*	1	9	31.2	26.1	10.5	*	
Nottingham	173,627	518	397	209	54	13	6	59	56	125	..	2	4	1	10	1	107	42	14	17	18	35.1	26.9	8.5	2.8	E. Seaton, M.D.
Nuneaton	7,400	19	12	7	1	..	1	1	2	6	..	..	..	..	..	..	6	..	..	..	..	30.3	19.1	9.6	0.0	E. Peacock.
Oldham†	115,413	325	197	62	40	20	11	36	28	54	..	7	15	..	4	3	25	32	17	5	8	36.7	22.2	6.1	3.6	J. M. Sutton, M.D.
Ovenden	8,000	18	15	4	1	..	..	5	5	..	..	..	..	..	..	..	*	4	1	1	..	26.5	22.1	0.0	5.9	J. Steele.
Oxford†	37,500	107	64	25	4	8	4	8	15	18	..	..	..	..	..	2	16	5	8	3	6	37.2	22.2	6.3	1.7	A. Winkfield.
Padiham and Hapton	9,000	26	11	3	3	..	2	..	3	3	..	..	2	..	..	..	1	1	1	..	..	34.0	14.4	3.9	1.3	J. G. Booth.
Pembroke‡	15,000	57	27	6	7	2	3	5	4	6	..	1	..	..	2	..	3	1	1	1	..	39.6	18.8	4.2	0.7	D. P. Saer.
Penzance	12,000	23	26	16	3	..	..	1	6	13	..	..	..	..	3	..	10	1	1	..	..	22.6	25.5	12.8	1.0	G. B. Millett.
Peterborough†	20,000	69	32	9	2	1	3	9	8	5	..	..	2	..	..	1	2	3	6	2	..	45.0	20.9	3.3	2.0	W. Thomson, M.D.
Plymouth†	74,993	170	152	52	19	5	8	31	37	45	..	1	..	3	..	5	30	10	13	3	13	29.6	26.4	7.8	1.7	H. Greenway.
Pontypool	5,100	13	4	3	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	30.0	9.2	0.0	2.3	S. B. Mason.
Poole	11,350	41	17	7	2	..	2	3	2	3	..	..	..	..	..	..	3	2	2	..	..	48.5	17.6	3.1	2.1	H. A. Lawton.
Portsmouth	134,224	357	235	92	35	5	13	49	41	78	..	2	..	..	3	6	67	12	15	4	21	31.3	20.6	6.8	1.1	G. Turner.
Preston†	88,000	291	255	120	48	3	8	50	26	106	..	..	3	1	4	..	98	15	22	7	10	43.1	37.8	15.7	2.2	H. O. Pilkington.
Ramsgate†	22,200	48	34	11	8	1	2	5	7	10	..	..	3	..	..	..	7	3	2	..	4	28.2	20.0	5.9	1.8	E. Walford.
Ravensthorpe (Yorks.) ..	4,560	13	10	7	2	..	..	..	1	1	..	..	1	..	..	..	..	2	2	..	..	33.6	25.8	2.6	5.2	W. Marsden.
Rawmarsh	9,652	38	16	6	6	..	..	2	2	3	..	..	..	..	..	..	3	1	1	..	..	46.3	19.5	3.7	1.2	W. J. Smith.
Reading†	41,500	97	65	27	17	3	2	10	6	34	..	1	7	1	..	1	24	3	4	2	4	30.5	20.4	10.7	0.9	J. Shea, M.D.
Redditch	10,070	28	7	1	2	1	..	3	..	1	..	..	..	..	..	..	1	1	1	..	..	32.7	8.2	1.2	1.2	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	22	28	12	5	..	..	5	6	10	..	..	..	..	3	..	7	4	1	..	..	27.3	34.7	12.4	5.0	J. S. Hichens.
Reigate	18,000	44	23	7	1	1	1	6	7	4	..	1	..	..	..	..	3	2	1	..	1	28.8	15.0	2.6	1.3	E. L. Jacob.
Richmond (Surrey)	19,500	54	28	8	3	1	1	11	4	5	..	..	..	1	..	2	2	2	2	1	4	32.6	16.9	3.0	1.2	J. T. Rowland, M.D.
Rochdale	72,720	166	98	30	15	5	7	26	15	13	..	..	..	..	2	3	8	4	8	6	..	26.9	15.9	2.1	0.6	J. Henry, M.D.
Rochester	12,500	34	23	10	3	1	..	7	2	8	..	..	1	..	1	..	6	2	2	..	3	32.0	21.7	7.5	1.9	J. Sladen-Knight, M.D.
Romsey	4,481	10	10	3	..	..	1	2	4	3	..	..	..	..	..	..	3	..	2	..	..	26.2	26.2	7.9	0.0	F. Buckell.
Rotherham	34,404	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Hardwicke, M.D.
Rowley Regis	27,000	77	43	13	10	..	1	8	11	10	..	1	..	..	..	..	9	8	1	4	..	33.6	18.8	4.4	3.5	J. G. Beasley.
Rugby	8,916	23	8	4	..	..	..	1	3	2	..	..	..	..	..	..	2	2	..	..	..	30.4	10.6	2.6	2.6	G. Wilson, M.D.
Runcorn	14,000	50	35	20	2	4	..	6	3	20	..	..	..	..	..	1	19	2	1	2	..	42.1	29.4	16.8	1.7	R. H. Mouritz.
Rusholme†	12,500	28	14	6	2	..	..	6	..	3	..	..	..	..	..	..	3	1	3	..	..	29.2	14.6	3.1	1.0	J. Gregory.
Ryde	12,800	*	13	1	1	1	1	5	4	2	..	1	..	..	..	..	1	..	3	2	3	*	12.0	1.8	0.0	A. Platt Wilks, M.B.
Saffron Walden	5,942	8	5	..	1	1	..	2	1	..	..	..	..	..	..	..	..	1	1	..	3	15.8	9.9	0.0	2.0	W. Armistead, M.B.
Salford†	185,786	543	479	189	113	29	13	88	47	193	..	9	19	3	9	10	143	57	32	9	32	38.1	33.6	13.5	4.0	J. Tatham, M.D., S.Sc.C.Camb.
Selby	5,720	14	11	4	1	..	3	..	3	4	..	..	..	..	..	..	4	..	2	..	1	28.8	22.6	8.2	0.0	J. M. Wilson, M.B., S.Sc.C.C.
Sheffield†	304,938	835	616	266	136	*	*	*	72	250	..	4	15	..	2	11	218	94	31	7	40	35.7	26.3	10.7	4.0	T. W. Hime, B.A., M.B.
Sittingbourne†	9,000	34	22	11	5	1	..	2	3	10	..	..	1	..	..	..	9	1	..	..	..	49.3	31.9	14.5	1.4	H. G. Sutton.
Slough	5,890	8	7	1	..	..	3	1	2	..	..	..	..	..	..	..	..	..	2	1	1	16.0	14.0	0.0	0.0	A. J. Southey.

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Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1,000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping-Cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.			Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
SMETHWICK	21,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. Sutton.
SOUTHPORT	34,100	86	79	25	18	3	2	19	12	9	..	2	..	..	..	..	7	2	7	1	6	29.8	27.4§	3.1	0.7	H. H. Vernon, M.D.
STALYBRIDGE	23,405	59	40	13	4	2	4	9	8	13	..	1	1	..	..	1	10	10	5	..	..	29.7	20.1	6.5	5.0	F. J. Roberts-Dudley.
STOURBRIDGE	9,376	29	10	..	..	2	1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	36.4	12.6	0.0	0.0	R. Eagar, M.D.
STRATFORD-ON-AVON	7,899	*	15	6	1	..	1	3	4	5	..	..	..	..	..	..	5	2	1	1	5	*	22.4	7.5	3.0	G. H. Fosbroke, S.Sc.C.Camb.
STROUD	7,608	27	10	2	..	..	..	3	5	..	..	..	..	..	..	..	..	1	..	..	1	41.8	15.5	0.0	1.5	T. Partridge.
SUNDERLAND†	116,730	316	240	93	61	23	6	29	28	76	..	3	24	..	..	6	43	33	12	7	9	35.3	26.8	8.5	3.7	H. J. Yeld, M.D.
SWANSEA	65,890	195	91	30	12	6	9	18	16	14	..	..	6	..	..	3	5	12	4	6	4	34.8	16.3	2.5	2.1	E. Davies.
SWINTON	7,753	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C. S. Blythman, M.B.
TAMWORTH	4,846	13	8	4	1	..	1	2	..	2	..	..	1	..	..	..	1	..	1	1	..	31.6	19.4	4.9	0.0	H. J. Fausset, M.D.
TAUNTON	16,227	40	21	9	1	..	..	6	5	5	..	..	..	..	2	1	2	1	2	..	..	29.0	15.2	3.6	0.7	H. J. Alford, M.D.
TEIGNMOUTH	7,000	24	8	5	..	..	1	1	1	4	..	..	1	..	..	..	3	..	1	..	..	40.3	13.4	6.7	0.0	W. C. Lake, M.D.
TEWKESBURY	5,500	16	10	2	..	1	..	2	5	3	..	..	..	..	..	1	2	1	..	..	4	34.3	21.4	6.4	2.1	W. Allard.
THORNHILL	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. Marsden.
TIVERTON	10,400	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. P. McNeill, M.D.
TORQUAY	26,000	*	24	8	4	1	1	5	5	7	..	1	..	..	..	..	6	..	4	2	..	*	10.9	3.2	0.0	P. Q. Karkeek.
TOTTENHAM†	37,000	133	71	41	12	3	2	8	5	30	..	..	2	..	2	..	26	1	1	3	4	46.9	25.0	10.6	0.4	C. T. Conolly.
TOXTETH PARK‡	8,000	26	7	3	..	..	1	2	1	1	..	..	..	..	1	..	..	..	..	..	..	33.9	9.1	1.3	0.0	J. McClelland, M.D.
TREDEGAR	18,000	53	26	2	8	1	2	7	6	4	..	1	..	..	..	3	..	1	3	2	3	34.7	17.0	2.6	0.7	G. A. Brown.
TROWBRIDGE‡	12,000	23	10	2	1	1	1	2	3	1	..	..	1	..	..	..	..	2	..	..	..	20.0	8.7	2.9	1.7	G. C. Taylor, M.D.
TRURO	11,049	20	19	7	1	1	3	5	2	6	..	..	1	..	1	1	3	1	4	1	..	21.3	20.3	6.4	1.1	E. Sharp.
TUNSTALL†	15,500	53	31	17	6	..	1	4	3	9	..	..	..	..	..	..	1	8	2	1	..	44.6	26.1	7.6	1.7	J. P. Edwards.
ULVERSTON	11,000	35	12	1	..	2	..	2	7	1	..	..	..	..	..	1	..	..	..	..	3	37.5	12.9	1.1	0.0	A. Thompson, M.D.
WALKER-ON-TYNE	8,000	35	15	6	6	..	1	1	1	7	..	..	1	1	1	..	4	3	1	..	..	51.5	22.1	10.3	4.4	H. F. Hurst.
WALLASEY†	20,000	65	22	7	5	1	1	5	3	2	..	..	..	..	..	..	2	1	4	..	1	42.4	14.3	1.3	0.7	I. Byerley.
WARMINSTER	5,786	5	3	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	10.2	6.1	0.0	0.0	P. Grubb.
WARRINGTON	40,000	185	77	43	9	4	3	7	11	20	..	..	1	..	..	..	19	7	3	2	9	54.5	22.7	5.9	2.1	G. W. Joseph.
WEDNESBURY†	26,000	66	27	7	10	2	2	4	2	9	..	..	4	..	..	1	4	..	1	..	..	33.1	13.5	4.5	0.0	J. C. Garman.
WEST BROMWICH†	54,000	160	75	26	12	3	6	14	14	13	..	1	1	..	2	2	7	8	5	3	7	38.6	18.1	3.1	1.9	J. Manley.
WEST DERBY†	33,693	79	48	23	8	2	2	6	7	16	..	..	1	1	3	..	11	3	4	1	..	30.6	18.6	6.2	1.2	W. Carter, M.D.
WESTON-SUPER-MARE	14,000	20	25	12	3	1	2	1	6	4	..	..	..	..	..	..	4	4	..	1	2	16.8	21.0	3.4	3.4	C. V. Hitchins.
WEYMOUTH	15,769	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. Tizard, M.D.
WIDNES	22,000	85	58	29	14	2	3	4	6	27	..	..	..	..	..	1	26	3	2	..	..	45.5	31.1	14.5	1.6	W. Cooper.
WILLENHALL†	19,300	54	37	10	16	5	..	2	4	22	..	..	9	..	2	..	11	5	..	1	..	36.5	25.0	14.9	3.4	W. H. Hartill.
WITHINGTON	15,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. C. Railton, M.B.
WOLBOROUGH	7,300	*	9	2	..	2	1	1	3	1	..	..	..	..	..	..	1	..	1	1	..	*	14.5	1.6	0.0	L. Armstrong.
WOLVERHAMPTON†	76,000	194	122	49	18	10	5	21	19	27	..	1	1	..	2	1	22	15	3	6	10	33.3	20.9	4.6	2.6	J. H. Love.
WOMBWELL†	7,500	34	15	7	5	..	2	..	1	4	..	..	..	..	..	2	2	1	2	..	..	59.1	26.1	7.0	1.7	J. N. Millar, M.B.
WORKINGTON†	10,000	*	12	1	2	3	1	2	3	2	..	..	1	..	..	..	1	2	2	..	..	*	15.6	2.6	1.3	J. Ward, M.D.
WORTHING	9,540	23	16	6	2	1	1	3	3	2	..	..	..	..	..	..	2	..	3	..	..	28.4	19.8	2.5	0.0	C. Kelly, M.D.
YORK	46,850	146	144	61	34	7	5	17	20	76	..	..	3	..	5	2	66	5	9	2	3	32.5	36.7	19.1	1.3	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.
‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 23.54.

ratory organs, excluding phthisis, averaged 2.3 per 1,000 persons living in those sanitary districts for which the information is available, against 3.6 and 2.7 in the two preceding months. Proportionally high death-rates from these diseases prevailed, however, during August, in Louth, Failsworth, Keighley, Farnham, and Lytham; the numbers in most of these districts, however, are almost too small to yield monthly rates trustworthy for comparative purposes.

Infant mortality, measured by the proportion of deaths under one year to births registered, showed a marked increase last month, owing to the great fatality of summer diarrhœa, and averaged no less than 276 per 1,000 in those of the 192 urban sanitary districts for which the information is available. In the twenty large towns the death-rate of infants also averaged 276 per 1,000, against proportions of 120 and 190 in the two preceding months. Infant mortality during August was equal to 245 per 1,000 in London; while in the nineteen large provincial towns, the proportion averaged so high as 305, and ranged from 168 and 185 in Bristol and Oldham, to 385 and 420 in Norwich and Nottingham. Among the smaller urban sanitary districts infant mortality showed the largest proportional excess in Barnsley, Burslem, Cheltenham, Colchester, Coventry, Leigh, Lincoln, Luton, Preston, Runcorn, Tottenham, Tunstall, Widnes, and York. In Preston and York, the proportion of infant mortality was so high as 412 and 418 per 1,000 respectively.

Our table of August statistics includes the following fifteen watering places and health resorts:—Bangor, Brighton, Dawlish, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, and Worthing. The usual return from Weymouth had not come to hand when we went to press. The annual death-rate in these fifteen watering places during August, although most of them were crowded with visitors, who are not counted in the estimated population, did not average more than 20.3 per 1,000; the zymotic death-rate was equal to 5.0 per 1,000, mainly owing to infantile diarrhœa, which was fatally prevalent in Brighton, Eastbourne, and Penzance. The deaths referred to the six other zymotic diseases in these watering places were remarkably few, and the above figures afford satisfactory evidence of the health condition of these holiday resorts, and of their comparative freedom from zymotic fatality. The death-rate from diseases of the respiratory organs during August in these watering places, exclusive of Brighton, for which we have not yet succeeded in obtaining the information, did not exceed 1.4 per 1,000, against an average of 2.3 in all the sanitary districts.

We have again to thank all the contributing Medical Officers of Health for their co-operation, and venture to hope for a continuance of the steady increase in the number of sanitary districts in our list, that has occurred from month to month during the past year. We may take this opportunity to repeat that the labour of compiling the statistics from the post-cards and revising or supplying the calculated rates is much facilitated by the early transmission of the cards. Our thanks, therefore, are especially due to those Medical Officers of Health whose cards for August came into our hands on or before the 5th September; while in more than 40 cases we posted reminders, because the cards had not been received up to the 7th inst.

SPECIAL REPORTS.

INDUSTRIAL DWELLINGS.

AT the half-yearly meeting of the Improved Industrial Dwellings Company (Limited) a dividend of 5 per cent. was declared, which will absorb £10,625, and £3,538 was carried to reserve. The total number of dwellings in occupation and in course of erection was reported as 3,921, for the accommodation of about 19,000 persons. In the parish of Bethnal Green, 166 old houses had been pulled down to form sites for the Company's improved dwellings, and the new buildings in this parish amount to a rateable annual value of £9,500.

In this same parish, the Bethnal Green House Property Association are quietly and unobtrusively doing a work which greatly improves the sanitary state of the parish, whilst it returns the Association a fair interest on their capital invested, and provides for a class of tenants to whom the arrangements and bare distempered walls of the Industrial Dwellings Company are distasteful. This Association is composed of local tradesmen, who utilise their local knowledge in purchasing reasonably ruinous old property, consisting frequently of small one-story cottages with front gardens, situate in *culs-de-sac* of very narrow dimensions. Pulling these down, they widen the court, and, if possible, open out the ends and erect new three-story buildings, with three-room tenements on each floor, each separately provided with ranges, larders, coal-bins, sinks, water-supply, and other domestic conveniences. The drainage from the houses is delivered over open external traps, so as to be completely cut off from the sewer. The houses are economically built and managed, and are let rapidly. The latest operations of the society are at 'Gale's Gardens', heretofore a most insanitary area. The new houses built or in course of erection number thirty-five. Messrs. A. and C. Harston are the architects.

DISEASES OF ANIMALS COMMUNICABLE TO MAN.

AT the recent meeting of the British Medical Association at Cambridge, the following discussion took place in the Public Health Department as to diseases communicable from animals to man.

Mr. Vacher, Medical Officer of Health, Birkenhead, said that there were seven diseases which had been generally supposed to be communicable, and these were rinderpest, pig typhoid, pleuro-pneumonia, foot-and-mouth disease, anthrax, erysipelas, and tuberculosis. Of these seven, he believed that only two were communicable to man—namely, foot-and-mouth disease and anthrax.

Mr. Fleming, of the Army Veterinary Department, was of opinion, that of all the diseases transmissible from animals to man, tuberculosis was the most formidable, and demanded the most serious attention. He also pointed out that the disease of glanders from which horses suffered, was communicable to human beings when they partook of the flesh of the horse so suffering. In view of what he had stated, it came to be a question how far animal vaccination would be affected by tuberculosis. He thought investigation into this matter ought to be impressed upon the Government.

Dr. Syson, Medical Officer of Health, Huntingdon, while of opinion that many of the affections which were alleged to be communicable were based on

purely sentimental grounds, thought that the Legislature ought to interfere in the use of horse flesh, because horses were so valuable while living, that they would not be sold for food unless they were subject to some disease. He asserted that 50 per cent. of the meat we eat was more or less affected with tuberculosis.

Dr. Cameron said that in the city of Dublin, where he was Sanitary Officer, they condemned from four to five hundred carcases annually, in which traces of diseases such as were said not to be communicable to human beings had been discovered; and he thought that the gentlemen who said there was no danger from eating the flesh of animals said to have been attacked with rinderpest, would not eat themselves or allow their families to eat such meat.

Dr. Drysdale, London, questioned the fact that tuberculosis was communicated from animals to man. He thought this question should be thoroughly understood before statements were made which were calculated to frighten people so deplorably.

After some further discussion, a resolution was carried to the effect that this subject urgently demanded inquiry, and that legislation was desirable in connection therewith, and that the Committee of Council be asked to appoint a committee to report upon the matter.

SANITARY IMPROVEMENTS AT PRINCETON COLLEGE.

WE read in the American *Plumber and Sanitary Engineer*, with reference to the outbreak of enteric fever at Princeton College, reported in the SANITARY RECORD of July 15, that the Trustees have taken energetic measures to put their buildings in good sanitary condition. With this object they appointed, as a commission to recommend proper methods, Dr. E. G. Janeway of the New York Board of Health, and Dr. E. M. Hunt of the New Jersey Board of Health, with instructions to those gentlemen to select as their associate a civil engineer of experience in sanitary matters. Mr. Edward S. Philbrick of Boston was so selected. This commission has made its report, and the trustees have employed Mr. Philbrick as constructing engineer to carry out the measures recommended.

This gentleman proposes to collect all the sewage from the several college buildings in smooth glazed stoneware drains, carefully laid and ventilated, and to dispose of it by irrigation under the soil upon lands belonging to the college. In order to avoid any possible risk of contamination of the air in the dormitories, all sinks and water-closets are to be removed from these buildings.

It was found that the late outbreak of fever at Princeton originated in a house where the water-supply was drawn from a well about fifty feet deep, with a cesspool on both sides of it, about fifty feet distant, in a soil so porous that the contents had not been removed for several years, so that a large amount of soakage must have taken place.

LONDON STREETS AND LONDON SMELLS.

THE National Health Society, 44, Berners Street, is calling the attention of the Vestries of the Metropolis to the unwholesome condition of the streets of London in hot weather.

In a document, signed on behalf of the Council by Mr. Ernest Hart, Chairman, and others, it was represented that the intolerable smells that have lately pervaded the streets of the West End have been the subject of frequent complaints in the daily papers. Streets smelling like very badly kept stable yards have been, throughout the past and other seasons, injurious to health and prejudicial to trade. It is estimated that more than one thousand loads of dung are daily deposited on the streets of the Metropolis; one hundred loads on the streets of the City. Even surface cleaning is so imperfect in the greater part of London, that much of this filth remains upon the streets in a noxious state of decomposition, while it is blown about by the wind and washed into the drains, where it too often lies stagnant in the ill-constructed and ill-cleansed sewers, which are under the charge of the Vestries. In some of the streets under the care of the Corporation of the City, a more perfect daily sweeping keeps the surface clean, but to see streets thoroughly well washed and clean, Paris, Vienna, or Madrid, must be inspected. In the City of London, the hydrants which are now in use for protection from fire might well be made serviceable for washing the streets and flushing the sewers. Heavy thunder showers and storms of rain occasionally act as scavengers, and actually diminish the death-rate by their refreshing effects. Much also might be done by amending the form of the sewers and making them self-cleansing, and it is said that where this has been done in a part of Holborn the expense has been less than that involved in cleansing them by flushing. No doubt the early attainment of a water-supply under competent public control will be the most effective means of remedying these evils. It cannot, meanwhile, be too often impressed on intelligent ratepayers that all foul and depressing smells mean the continuance of sickness and of a high death-rate.

THE SANITARY STATE OF BIDDENDEN.

A REPORT has been made to the Local Government Board by Dr. Thorne Thorne on the sanitary state of Biddenden. From this report it appears that the water-supply of Biddenden is very scanty, and, as a rule, unfit for human consumption. One of the only two wells in the place is obviously fouled by soakage of filth from the surrounding soil. The other has the reputation of affording a wholesome supply, but it can only be resorted to by the favour of the publican on whose premises it is situated. Ponds form the general water-supply. Some of these are so foul that it is almost incredible that they can, as stated, be used for any household purposes, and even the best ones to which the public have access contain a good deal of decaying vegetable matter, and the water they afford is at times greatly discoloured. One, which is stated to be largely resorted to, is also in dangerous proximity to a ditch containing stagnant sewage and slaughter-house refuse. In some instances, too, even these improper supplies have to be procured at a considerable distance from the houses of those seeking water.

The village has no proper system of sewerage and drainage. On the south side of one of the two so-called streets, the houses drain into a large brick culvert originally constructed for the purposes of road drainage, but the house drains leading to this culvert are of the most faulty construction, and occasion considerable nuisance. Running behind the houses and in actual contact with the walls and foundations is a broad, open, irregularly bricked

channel, with here and there a species of cesspit containing offensive semi-solid matters. In more than one place the sewage is conveyed by imperfect and obviously leaky drains under the cottages, rendering their interior damp, foul, and unfit for human habitation. Ultimately the sewage gets into a ditch at the west of the village, where it is joined by another offensive sewer ditch. On the north side of the same street the house drainage mainly finds its way into ditches which are so foul and in such proximity to the dwellings that they must of necessity be a source of great nuisance and of danger to health. In the remainder of the village the drainage is almost exclusively into open channels and ditches situated either by the road side, or around and close to the houses. The means of excrement disposal is almost invariably the common privy with a sunk brick vault. Some of the privies are in dangerous proximity to the houses—in certain cases actually adjoining them —or even under the same roof.

Under these circumstances it is not surprising that diphtheria, when it once got a hold on the village, should have become very prevalent and very fatal. So far as can be ascertained at this distance of time, a child, whose attack did not appear to be due to infection from any prior case, sickened in the autumn of 1875, in one of a row of houses where the sanitary circumstances are very defective. About two months later, the disease reappeared in the same house, where it attacked six children. Two other attacks, one a fatal one, occurred in the last quarter of the same year at a house where the conditions of drainage were and still remain specially offensive. No further cases appear to have been reported until January 1877; but during this and the three following months, 17 more cases occurred, and five of them terminated fatally. Early in 1878 the disease again appeared in the village, seven children suffering, and one dying, from it. Thus, between October 1875, and March 1878, diphtheria was a constantly recurring cause of disease and death in this little village; 33 cases and 7 deaths having occurred there. Although there can be but little doubt that personal infection materially contributed to the spread of the disease, yet the official inspection of the village showed that the diphtheria was specially prevalent and fatal on premises where the air was notably befouled by sewer and excremental nuisances. During each of the three outbreaks in 1876, 1877, and 1878, some cases occurred in houses situated in other parts of Biddenden parish, which has an area much larger than that of the village. The earliest of these outlying cases were always in children, and without associating every attack directly with prior attacks in the village, yet infection derived from thence was, doubtless, a main cause of the disease. Grouping all the cases together which have occurred in the parish during the period referred to, there have been, including one fatal case of so-called 'croup', 64 attacks and 14 deaths.

Dr. Stanislas Martin suggests, in the *Bulletin de Thérapeutique*, 30th April, 1880, a method of purifying cistern water, and rendering it potable. It consists in the addition of the white of two eggs to each thirty litres of water. The mixture is to be well shaken up, and then heated to 100° Cent. The albumen forms a large clot which entangles all organic germs and floating particles, which, rising to the top in the form of a scum, can be easily removed. The water should subsequently be strained.

LAW REPORTS.

LIBEL UPON A MEDICAL OFFICER OF HEALTH.

This case was heard at the Manchester Assizes, before Mr. Justice Bramwell. The plaintiff was Dr. John Makinson Fox of Lymm, the Medical Officer of Health for the 'Mid-Cheshire Combined Sanitary District'. The defendant was Mr. William Robson, of Lymm, and formerly a member of the Lymm Local Board. The alleged libel was contained in a letter written by the defendant which appeared in a newspaper at Warrington on the 13th March, 1880. The plaintiff alleged that 'the whole article was intended and calculated to bring him into public odium, and had in fact done so'; and he claimed £1,000 damages. In the claim it was stated that in January 1880, Lymm was visited by an outbreak of scarlet fever, and it became the duty of the plaintiff as Medical Officer to take measures to repress and localise the epidemic, and that he used all necessary precautions to do so; but several deaths unavoidably occurred in the sub-district of Lymm. The plaintiff alleged that the defendant in his letter meant he (Dr. Fox) had not used all the means in his power to limit the spread of the outbreak, nor given the same attention to the cases which he was officially bound to attend as he would have given to private patients, and that the hypothetical cases substantially represented the facts of the Lymm outbreak. That the defendant meant there was a hospital for the accommodation of the fever patients quite close to the village, whereas the hospital was five miles distant from Lymm; and that the plaintiff and the Local Board had power to remove compulsorily the fever cases at Lymm to the Warrington Hospital, whereas they had no such power, nor was it safe or desirable to remove them to such a distance, having regard to the then severe and inclement weather. That the defendant meant that the plaintiff had perversely and unskilfully met the outbreak of fever, had wilfully neglected the obvious and proper precautions to check it, had neglected his duty as Medical Officer, and that five deaths were attributable to his misconduct and want of skill. That the defendant intended to excite public indignation against him, and meant to repeat the charges of misconduct and unskilfulness for not having compelled the Local Board to remove the Lymm fever cases to the Warrington Hospital. That the plaintiff was primarily responsible for the outbreak of fever by not compelling the Board to take certain sanitary precautions. That the defendant, by drawing attention to the plaintiff's salary, meant to excite the indignation of the public against him as a negligent, dishonest, and incompetent public servant. That the plaintiff, having been negligent and remiss in the performance of certain of his public duties appertaining to the health of the district, was guilty of wilfully omitting from his official reports any reference to such matters. That the defendant intended to excite the indignation of the public against the plaintiff as a public officer, who, in order to cover his own negligence and incompetence, made official reports as to his duties and his performance of the same which were not truthful.

The defendant pleaded justification and privilege.

Mr. Ambrose, on behalf of the plaintiff, said that he had to act as Medical Officer for the village of Lymm, which is managed by a Local Board. He was appointed to the office about May 1878,

and very shortly afterwards it became his duty to make a report to the Local Board with reference to some nuisances which existed in the district of Lymm. That report was brought under the consideration of the Local Board. The result was that a number of nuisances were abated. The defendant, who was a member of the Board, was appointed a member of a sub-committee to consider what should be done for the purpose of obviating certain matters complained of by the plaintiff. To meet that report various proposals were made, one by the defendant himself, being a proposal to introduce the Manchester pail system into Lymm. The matter came before the Board, who consulted with their Medical Officer, Dr. Fox, who was obliged to give his opinion, which, it would appear, rather gave offence to the defendant. The defendant, finding that his own plans could not be carried out, resigned his position as a member of the Board, assigning as his reason that the Board and himself were at variance, and therefore they would not be able to act together. Having retired from the Board, the defendant wrote a letter to the *Guardian*, criticising Dr. Fox's conduct. It appeared that in January of the present year scarlet fever broke out in the village of Lymm, as it had broken out in other places in this country. The libel was contained in a letter published in a local print, and was as follows :—

'Sir,—The Local Board and Dr. Fox have now made their statements in defence, or in explanation, of their conduct, with reference to the outbreak of scarlet fever in Lymm; and so we are one step nearer to a final judgment on the question of the respective or mutual responsibility in relation to it. Now, to help the public to come to a sound decision on this subject, let us suppose a case and try their conduct by it. Let us suppose an outbreak of scarlet fever—primary cause utterly unknown—in one of our numerous Lymm mansions, and let us suppose that Dr. Fox was, not the Medical Officer of Health of the district, but a respectable village practitioner, called in to attend it. His first direction to the mother would undoubtedly have been to isolate the patient, to separate it from every other member of the family except herself and one of the nurses, and the most convenient room in the mansion to carry out the plans would be set apart for it. Probably he would intimate the great desirability, in order to remove all danger from the others, that, under the circumstances, the rest of the children, with a nurse and governess, should go and learn their daily lessons at the sea-side till the little sufferer recovered; when the sick room and all its furniture would be disinfected, the ceiling limewashed, and the walls freshly papered; and the convalescent, with its mother and nurse, would go to the sea-side also, till all possible danger was over. Next, we will suppose the same Dr. Fox was called in to attend another case of scarlet fever, the child of a working man, but living comfortably and respectably in a good four-roomed cottage, of which Mr. Dixon's or Mr. Appleton's may be taken as a specimen. It is manifest that the doctor could not recommend the adoption of any such plans here as he did in the mansion; though the same plan as near as could be was equally necessary if the fever was to be kept from spreading. So to make the parallel complete, we will suppose that there is an hospital over the way to which the working-man, the father of the sick child, has subscribed for years, for the very purpose of protecting his family against infection in such cases. And we will suppose that the doctor, though he knows all this, quietly shuts his eyes to the fact, and allows the disease to run its course through the family; but to show that he is really doing something to save the healthy children in the house from taking the infection, sends his servant-man to pour a bucketful or two of carbolic acid into the grids and sewers round about the house. I ask, would not such conduct under such circumstances sound something very like insanity? And if the children died, as in the case of the Booths, one after another, till the whole family of five were swept away, would not such a doctor, as we have been supposing, be justly regarded in the public opinion of the district as morally responsible for the consequences? And yet to some large extent these suppositious cases, except so far as relates to Dr. Fox's private personal medical connection with them, represent the facts of this Lymm outbreak of scarlet fever. Though Dr. Fox was not the medical practitioner in attendance on any of the cases, he admits that he, the Medical Officer of Health for the district, knew of these cases; for he says, as reported in your paper, "that there was not a single case of illness from scarlet fever that had been known to the medical men which had not come under the notice of the Board", and therefore must have come under his own. And we must not for a moment forget that he is the Medical Officer of Health appointed for the purpose, as far as may be, of preserving the district from such outbreaks. And he and the Local Board had the power, within their own hands, of legally and orderly opening the door of the hospital for the reception of all the victims who have died. The only way by which a family in a cottage can be preserved from this infection is—just as in the case of the family in the mansion—by isolation, by separation of the patient from the other members of the family. This separation can only be carried out in the case of the poor man's family by sending the sick child to the hospital and leaving the remainder of the family at home. Now the hospital is there, rented by the Local Board for this very purpose of saving the public from such outbreaks, and yet, until nine deaths from scarlet fever had occurred in Lymm—that is, until the disease had been allowed to sow its seed broad-cast over the village—there was not a single case sent to the hospital in Warrington. All this is tacitly admitted by the public proceedings of the Board. It is true that the Board caused notices of caution, signed by the law clerk, to be printed and posted on the walls, and disinfectants were freely used about the drains and ashpits of infected places. But for all efficient practical purposes, the law clerk might as well have whistled to the wind to take the infection away. The seed of the infection was in the human bodies of the patients, and not in the ash-pits and drains. All methods stopping short of the separation of the infected patient from the healthy members of the family are comparatively useless, and can only end in bringing all sanitary regulations into discredit with the common people. The ash-pit, drain, and sewer question in Lymm no doubt should be attended to. Dr. Fox knows a good deal about it, if not more than anybody else. Why has the Board allowed so many cottages in Statham to be occupied by the labouring class, without pure water and without sufficient drainage for the purposes of health and comfort, when the Board had the means in its own hands of enforcing all needful sanitary regulations? And why did not Dr. Fox, as Medical Officer of Health, compel the Board to do

its duty in this respect if all quieter means proved ineffectual? For what does he receive his large salary of £800 a year but to see that the Board of Health in his district do their duty? If the doctor had spoken with the same energy and determination in 1878 as he did on last Friday night, the evil of which he spoke, and to which he imperatively directed their attention, would have been remedied then. Had all this needful work been done in time, and the first cases of the present outbreak of scarlet fever been sent to the hospital as soon as the presence of the disease was recognised, it is as certain as human probability can go that the outbreak would have been at once stopped in its course, and no bereaved mother in Lymm would have had to mourn the loss of her child. But the doctor promises a special report on the subject by-and-bye. There is nothing now left us but to wait patiently for it, and see what crumbs of comfort it will afford. But don't let him forget to tell us—we will forgive every other omission he chooses to make—why it was, and let us have the truth, the whole truth, and nothing but the truth, about it—why it was that the first patients were not sent to the hospital? And does the doctor admit any personal responsibility of his own in the matter?—Yours faithfully, W. ROBSON.

'West View, Lymm, March 10th, 1880.'

That was the letter. Although the plaintiff was the Medical Officer of Health for a number of townships, extending over twenty or thirty miles of district, and comprising a population of 130,000 people, he was not the inspector of nuisances. A man had been appointed to undertake that duty in Lymm. The plaintiff's duties were defined by the Local Government Board orders, and there were no duties cast upon him similar to those suggested in the defendant's letter. Neither under the Local Government Board Act, nor under any other Act, had Dr. Fox power to compel the patients to go to the hospital. He admitted that it was his duty as soon as the contagion broke out to inquire into it and report to the Local Government Board. It was his duty to give advice to the Local Board and the Inspector of Nuisances, and to help them in every way he could; but he had not the power, nor was it his duty, to interfere in individual cases. He certainly had not the power to compel the Local Board to remove the patients to any particular hospital. There was no hospital in Lymm to which the patients could be removed. There was one at Warrington, five miles distant, to which the Lymm Local Board, on payment of a subscription of something like £52 a year, had the privilege of sending patients. When patients could be removed, no doubt they were removed, and were taken to the hospital at Warrington; but the plaintiff would tell the jury that when once scarlet fever had fairly set in, removal was at all times a most dangerous thing to resort to. The outbreak took place in the beginning of the present year, when the weather was most inclement, the frost being more severe than any which had been known for a long series of years. Therefore, to remove the patients in the ready way suggested by Mr. Robson, even if the parents of the children had been willing for their removal, was inexpedient. He believed that not a single case of fever occurred in Lymm of which the plaintiff had not cognisance. He may not have had cognisance immediately it broke out, and two of the patients died on the 4th February, before there was any chance of considering the question of removal. The plaintiff received from the medical gentleman living in the neighbourhood information of the disease having broken out; and he then took steps to see whether the patients could be removed. He suggested removal, but in several cases the parents were unwilling to have their children taken from them. There was no power under the Local Government Board orders by which they could be removed. There was a section under which, by an order of the magistrates—but it did not apply in the present case—the patient might be removed to a particular hospital if it was found expedient.

His Lordship asked if the letter advocated separation?—Mr. Ambrose: It does.

His Lordship: And you will not deny that that is necessary?—Mr. Ambrose: Not at all.

His Lordship: If I have caught it rightly the libel is as to the proper separation of the patients, which might have been done by sending them to the hospital; that he did not do his duty because he did not send his patients there?—Mr. Ambrose said that was the point. He was going to point out the unfair way in which the letter was written. The defendant explained what Dr. Fox would have done to his patient who resided in a fine mansion at Lymm, and he supposed what would happen in the case of the poor man, referring to Dixon and Appleton's cases, two of the earliest cases in the outbreak. Could they have a greater instance of the manner in which the defendant was seeking to work up the mind of the public against Dr. Fox than that? Notwithstanding the fact that the weather was so inclement, rendering it impracticable to remove the patients a distance of five miles, the defendant complained that nothing was done with the exception that the doctor sent his servant-man round the village to pour a quantity of carbolic acid into the grids. Dr. Fox, as soon as he heard of the outbreak, visited each patient as frequently as it was possible for him to do, and recommended isolation where it was practicable. The deaths were charged at the door of the medical officer. He would refer to the concluding words of the letter, which were to the effect that Dr. Fox promised a special report on the subject by-and-bye, and nothing was left but to wait patiently. It also suggested that the doctor was likely to misrepresent the facts, and he impressed upon him the necessity of telling the truth, the whole truth, and nothing but the truth, thereby suggesting to the public that the reports had been cooked and were false. The defendant then concluded by asking, 'And does the doctor admit any personal responsibility of his own in the matter?' That was the libel. It was a matter which had given him great pain indeed, and a matter which had put him in a very serious peril as regarded his position as Medical Officer of Health. He was not merely medical officer for Lymm, but for a very large district, including the townships of Altrincham, Congleton, Nantwich, Northwich, Lymm, Middlewich, Sandbach and Winsford. The appointment was from year to year, and was more or less controlled by public opinion. After the publication of the letter, the defendant was asked for an apology, and told that if he would freely withdraw the imputations which had been made he would hear no more of the matter. That he refused to do; but upon pressure he subsequently published what he (Mr. Robson) considered to be an apology. But Dr. Fox could not accept it as an apology; and the utmost that could be got out of him was the following letter:—

'I am told that Dr. Fox feels personally aggrieved at the use of his name; but I can only reply he was,

to my mind, *in loco parentis* in relation to the children, and the Government officer in charge of the health of the district; and that he had full power to have acted as I thought it was proper that some one should act. I had not a shade of feeling against Dr. Fox personally, and to this extent I apologise to him, namely, that if I have regarded him as responsible where he had no power to act otherwise than he did, I regret it. At the same time, I retain my opinion, that had the early cases been sent to the hospital, or otherwise isolated, so much loss of life would not have taken place.'

In covert language the libel was repeated and aggravated. Instead of pleading not guilty, and resting upon that defence, the defendant had pleaded justification, and was present to maintain the charges made in the letter.

His Lordship: Defendant may not have meant to suggest that Dr. Fox's treatment to the rich was different to that of the poor, but in the case of the rich he said there was isolation. In the case of the poor he said there was as much isolation as could be commanded.

Dr. Fox was then called, and said he was appointed the Medical Officer of Health in March 1878. He was appointed by a combined committee at a salary of £800 a year. The population of the district numbered 129,700. His salary for the Lymm district would be about £22. The defendant was formerly a member of the Local Board, and in 1878 he brought forward a scheme for the adoption of the pail system; but witness was not prepared to recommend it. In 1879 the defendant resigned his position as a member of the Board. In January of the present year scarlet fever broke out in Lymm, and plaintiff was first informed of it about the third or fourth of February. As far as possible he caused all local nuisances to be abated, and removed to the hospital all cases that could be removed. There was no hospital nearer than Warrington, and it was five miles from Lymm. The weather was particularly inclement, and the patients were children. There was also a very keen malignant east wind prevailing at the time. In all cases the patients were attended by qualified medical men. Witness did not attend them medically. He visited every house in which there was disease, and treated the outbreak to the best of his skill. He was simply the Medical Officer of Health. He had no private practice. He resided in Lymm, and was, therefore, well acquainted with the sanitary conditions of the village. His position debarred him from private practice. In July 1878 he made a somewhat elaborate report to the Local Board of the condition of the district.

Mr. Russell: I think you came to the conclusion that there was imperfect drainage, and made some remarks as to the ash-pit system and cesspool system, which would make the district, if fever broke out, a district in which it would be likely to spread?—Plaintiff: There were remarks of that nature.

Mr. Russell: This fever of which you have been speaking was scarlet fever?—Plaintiff: It was.

Mr. Russell: And you admit that it was eminently desirable there should be isolation?—Plaintiff: Certainly.

Mr. Russell: Did the Local Board do anything to remove the condition of things?—Plaintiff: The Water Company extended their mains through that part of the district in which the bad water was more particularly complained of.

Mr. Russell: Was that extension made after the outbreak of the fever?—Plaintiff: No, sir; it was after my report in 1878.

Further questioned by Mr. Russell, plaintiff said the Local Board caused the abatement of a great many insanitary conditions with regard to the closets, and 1,600 yards of sewerage was added. That for a time met the necessities of the case. It was as much as he felt the Board was called upon to do at the time. The defendant apparently took great interest in matters relating to the public health. He believed he also brought forward a scheme to improve the sanitary condition of the district. The change suggested was, in witness's judgment, of too radical or too sweeping a character for him to ascertain that it was, as stated, the best system for Lymm. If it had been the best, which he did not admit, that was not the time to introduce it. He had read the letter complained of, and he saw from it that Mr. Robson was of opinion he had power to order the removal of the patients. His opinion was that under the existing circumstances he had not the power. He was familiar with section 124 of the Public Health Act. They did not apply to the magistrates in any case for the removal of the patients. The law clerk advised that they had no power to remove them. The Booths were not paupers, but they became such. The Prices and Appletons were not paupers. He thought cases were removed to the hospital before the appearance of the letter complained of—Cowsill and Walker's, for instance. He had the power of an inspector, but not the obligation. He should be very much to blame if he acted as inspector of nuisances. The medical men of the village and himself worked harmoniously together with regard to all these cases. He forgot how many patients were removed after the appearance of the letter—probably ten. In the case of the Booths, one of the children was kept from home and its life was saved. All the children who were at home died. When he recommended the removal of the children he believed that Booth and his wife and an aged man were in the house. He recommended removal after the death of two of the children, but he had been previously in communication with the medical attendant, who thought the cases were not suitable for removal. There was a distinct and passionate refusal on the part of the Booths to have the children removed. In the half-year there were seventeen deaths from the disease, and there were still some patients left. The outbreak caused some alarm in the district. In Statham, as far as he could remember, there were not more than eight or ten cases. There was always a very large infant mortality in Lymm.

His Lordship: If the statement of defence had been particularised, we should not have had so much difficulty.

Mr. Russell: Your Lordship will see that that is not the main tenour of the defence.

His Lordship: I suppose your defence was that it was a *bona fide* comment on a matter of public interest?

Mr. Russell: Perfectly; and you may judge of that from the correspondence which took place between the solicitors to the plaintiff and to the defendant. The gentleman charged with the libel felt strongly that there was an alarming and serious sacrifice of life going on in the neighbourhood in which he lived. He took great interest in the condition of the poor classes of the community. He took a strong view, and a view which he still held, that if the outbreak of scarlet fever had been fairly

met at the outset it would have been stopped, and much human life spared. That was the view he took of the matter, right or wrong. Against the plaintiff he had not the shadow of a shade of ill-will; but he held the view that as the Legislature had debarred him from private practice, and had given him the general care of the health of the district, that he had power to take strong and resolute steps to prevent the spread of the disease. The defendant had the experience of an outbreak of small-pox in the same neighbourhood some time ago, and by acting on the lines suggested in the letter complained of it was fortunately stamped out. The plaintiff appeared to think he had nothing to do with the patients when there was a medical man in charge beyond making a suggestion. He did not know whether that view was a right one according to the 124th section of the Act.

His Lordship: I don't know, really. I think it is a most embarrassing section.

Mr. Russell, continuing, said that this was a matter of public interest, and the defendant had a right to express himself strongly. He was entitled to express his views, if they did not exceed the limits of fairness and honesty. His learned friend, Mr. Ambrose, appeared to be of opinion that the defendant ought to have complained to the Local Government Board. Had he done so, he would have had to wait for two or three days before receiving a promise from them 'that the matter should receive consideration'. Mr. Robson thought that prompt measures should be taken; and he, therefore, wrote the letter he did, so that the contagion might be stamped out, and the lives of the inhabitants saved. The defendant did not mean to assert that the poor would be treated in a different way to the rich, but that in the case of a rich man there were many rooms, and isolation could be completely carried out; whilst in the case of a poor man, isolation could only be carried out by removal. He would ask the jury to say that the defendant acted with perfect honesty in writing the letter and expressing the views he did.

The Defendant said he had interested himself in the welfare of the inhabitants for some years. He was a member of the Local Board, and resigned in 1879. He wrote the letter complained of to the newspaper, and he had no ill-feeling towards the plaintiff. He only knew of nine deaths when he wrote the letter; but Dr. Fox, in answer to interrogatories, said there were sixteen. He had a strong belief in the necessity of isolation in these cases. In the outbreak of small-pox he tried the experiment of isolation with great success. The cases were then sent to the hospital. He was of opinion that five children ought not to be kept in a cottage containing only four rooms. There was an ambulance, and it was the most perfect that could be constructed according to modern science. It belonged to the hospital authorities at Warrington.

Mr. Ambrose having summed up the evidence on behalf of his client,

His Lordship said to the jury: If you find your verdict for the plaintiff, you will have to give him damages. I ask you, is this a libel upon Dr. Fox, in his position as a medical man? The plaintiff is supposed to have acted in a particular way, and the defendant goes on to say, 'I ask would not such conduct under such circumstances sound something very like insanity? And if the children died, as in the case of the Booths, one after another, till the whole family of five were swept away, would not such a doctor as we have been supposing be justly regarded in the public opinion of the district as morally responsible for the consequences. And yet to some large extent these suppositious cases, except so far as relates to Dr. Fox's private, personal medical connection with them, represent the facts of this Lymm outbreak of scarlet fever?' It is for you to say whether this is libel. The law defines libel as anything which tends to bring a man into public contempt or ridicule, and anything which imputes to a man in his public office misconduct or incapacity—that he is either unfit for the office, or has not done his duty. If you think it is not a libel, and is not calculated to defame, injure, or prejudice the character of Dr. Fox—why then we need go no further.

The Jury found for the plaintiff, with forty shillings damages.

His Lordship: Of course I shall give judgment for the plaintiff, and I think the jury are quite right in awarding him 40s. damages. The plaintiff has done quite right in bringing the action into the court.

HOUSE OF LORDS' APPEALS.

Pharmaceutical Society of Great Britain v. *London and Provincial Supply Association.*

This was an appeal from the Lords Justices reversing an order of the Queen's Bench Division. The appellants, the Pharmaceutical Society, were incorporated in 1843 by Royal charter, which was confirmed by the Pharmacy Act, 15 and 16 Vict., c. 56. By the Pharmacy Act, 31 and 32 Vict., c. 121, certain regulations were made respecting the sale of poisons by persons who kept shops for retailing, dispensing, or compounding poisons. Under section 15 any person who should sell or keep any open shop for the above purposes, or who should take, use, or exhibit the title of chemist and druggist, not being a duly registered pharmaceutical chemist and druggist, or should take, use, or exhibit the title pharmaceutical chemist, pharmaceutist, or pharmacist, not being a pharmaceutical chemist, or should fail to conform with any regulations as to the keeping or selling of poisons, made in pursuance of the Act, or who shall compound any medicines except according to the formularies of the *British Pharmacopœia*, should for every such offence be liable to pay a penalty of £5, and the same might be sued for, etc. The respondents were a limited company, registered in 1878, for acquiring the business of a grocer and general warehouseman, carried on at 113, Tottenham-court-road, by William Mackness. The nominal capital was £10,000, divided into 1,000 shares of £10 each. Mackness held 504 fully paid-up shares. Six persons, including one H. E. Longmore, a duly qualified pharmaceutical chemist, held each five shares, upon which £2 10s. per share had been paid, three persons held one share each, and the remaining shares were unalloted. Mackness was the managing director. The business included a chemist's and druggist's shop, or a drug department, which was an open shop for retailing and compounding poisons, and where poisons are sold to the public. This department was under the management of Longmore, as a servant of the company. Under these circumstances, the appellants took proceedings against the respondents in the Bloomsbury County Court for the recovery of the penalty, on the ground that they were not properly qualified under the Act to keep an open shop for the sale of poisons. The Judge gave judgment in favour of the respondents, on the ground that as the business was conducted by a duly qualified chemist and druggist, no offence within the Act had

been committed. On appeal to the Queen's Bench Division, that decision was reversed. The respondents thereupon went to the Court of Appeal, which held that the decision of the County Court Judge was right, and reversed the judgment of the Queen's Bench Division. The Society appealed (see SANITARY RECORD, July 15, page 13).—Mr. Benjamin, Q.C., and Mr. Lumley Smith, Q.C., for the appellants; Mr. Wills, Q.C., and Mr. Finlay, contrà.—Their Lordships dismissed the appeal, holding with the Lords Justices that the word 'person' in the Pharmacy Act did not *primâ facie* include corporations, and was not declared to include them in the interpretation clause. Corporations ought not, therefore, to be held to be included unless there were strong reasons for it to be deduced from the scope and construction of the Act, and in their opinion there were no such reasons. A corporation could not dispense or compound poisons and drugs, or it could only do so by an assistant, and if he was duly qualified, as in this case, the object of the Act was attained.

ALLEGED INFRINGEMENT OF PATENTS.

Halliday v. *Roberts.*

The plaintiffs, Joseph Halliday and Co., of Manchester, patent filter mauufacturers, sought to restrain the defendants Roberts and Messrs. Harlow and Kinch, of Stockport, from making filters in alleged infringement of the patent taken out and assigned by Roberts, as patentee, and now worked by the plaintiffs' company.

The defendant was cross-examined on the construction of the filters made by the plaintiffs under the patent and those now made by himself, with the view of showing that he was practically manufacturing under the principle patented for the construction of 'self-cleansing filters', but with a colourable variation in the taps attached to the apparatus, the defendant alleging that his machines were improvements of the filter patented, the salient point of the patent being the use of a special form of duplex tap, while his filters were supplied with a different number and arrangement of taps necessitated by the improved construction. He first supplied the Manchester Infirmary with filters in 1870 or 1871, and the Stockport Infirmary in 1873. When he had asked Halliday, who had then purchased the patent, for permission to make up the materials he had in stock, Halliday gave him liberty to do so. From 1875 to 1877 he claimed the right to make up the stock he had, and he obtained other filters from the plaintiffs for sale. As a matter of fact he had sold filters made up from the stock he had on hand. An arrangement had been made between himself and Halliday, for the latter to supply him with filters to the value of £50, and subsequently to the amount of £110, but a difficulty arose, and as Halliday refused to continue the supply and he was obliged to make a living, he designed the improved filter in 1878. He had not taken proceedings against Mr. Halliday for the breach of his agreement. A considerable portion of the cross-examination and re-examination turned on the mechanical construction and operation of the various taps used in the rival filters.

Mr. John Mains, of Manchester, machinist, of twenty-two years experience, gave evidence in support of the defendant's case, stating that from an inspection of the respective machines, he considered the defendant's an improvement which required the use of the special arrangement of taps he had adopted, and that they could not be used in the plaintiffs' without alterations and additions, which would change the character of their filter and take it out of the patent.

The patent was for an admittedly novel and useful invention, carried out by certain means described in the specification. That patent had now by assignment become the sole property of the plaintiffs, and the defendants, being Mr. Roberts, the original patentee, and Messrs. Harlow and Co., brass and iron founders, who assisted him to make his filters, could not be allowed to say that a slight mechanical variation in the taps constituted a radical improvement which would enable him to infringe the patent he had assigned, the principle of which was a novelty, and that principle alone being carried out by the defendants' variation, simply amounted to a flagrant infringement. Numerous decided cases were referred to by the learned counsel in support of his case to show that a patentee or licensee could not be heard to contest the validity of any part of his patent as against his assignors, that consequently being estopped from contending that any part of the patent was unsustainable, he was not at liberty to use a colourable variation of any of the parts of the mechanical appliances in order to infringe the plaintiffs' patent.

Lord Denman held that the instances relied upon by the plaintiffs, of filters supplied by the defendant Roberts (the original patentee of the filters), did not constitute infringement of the patent, as the filters had been supplied before the patent became the property of the plaintiffs. On the construction of the patent, he held that the taps used in the new construction of filters, which was alleged to be an infringement, were different to those described in the specification; and on all grounds the plaintiffs had therefore failed to make out their case.

Judgment was accordingly entered for the defendants, with costs.

THE ISOLATION OF INFECTIOUS DISEASE.

Watson v. *Leamington College Company, Limited.*

This was a motion to restrain the defendants from using a certain cottage as a medical college, and also from using it for the purposes of the sanatorium, contrary to the covenants and the lease. It appeared that the cottage was enclosed with high walls, and there never could be more than five or six boys accommodated in the house at one time. The object of the college was for the treatment of boys suffering from infectious diseases. The defendant denied that the college was a public nuisance, and some of the boys who were pupils had gone home for their holidays.

The Master of the Rolls said that this college could not be regarded as a nuisance. It was not unfrequently the case that there were four or five children ill in a private family, and it could not be said that such house was a public nuisance. It seemed that there were not more than six apartments in the house, and the number of boys were limited. He would not make an order, as it was not an urgent case, and if need be application could be made to the vacation judge.

THE TOTTENHAM LOCAL BOARD OF HEALTH *v.* ROWEL.

This was an appeal from Vice-Chancellor Malins. (See SANITARY RECORD, July 15, 1880, page 33.) It was heard before Lords Justices James, Brett, and Cotton. Their Lordships held that upon the plain

grammatical construction of the Local Government Act, 1858, section 62, a charge was imposed upon the premises as soon as the expenses were incurred by the Local Board, and that there was no limitation of the time during which the charge was to remain in existence. This charge was not subsidiary to the summary remedies given by the Act against the owners or occupiers of the premises; and, although such summary proceedings must be taken within the period of six months, the charge was not affected by any such limit of time, but remained in force and might be resorted to when the summary remedies had failed to produce payment, or, as in this case, had not been put in force. The plaintiffs were accordingly entitled to the charge which they claimed upon the land of the defendant for his assessed portion of the rate, and had not lost their right to enforce it by lapse of time. The appeal must therefore be allowed.

RESIDENCE OF MEMBERS OF LOCAL BOARDS.

Palmer v. *White.*

This was an action brought by the plaintiff, who was described as a contractor, to recover penalties under the Public Health Act, 1875, from the defendant for acting as a member of the Balsall-heath Local Board at a time when he resided out of the district.

Mr. Buszard, Q.C., for the plaintiff, in opening the case, said that the action was brought under Schedule 3, Rule 7, of the Public Health Act, 1875, which provided that any person who acted as a member of a Local Board without being duly qualified, was liable to a penalty of £50, which might be recovered by any person. By rule 3, no person was qualified to act as a member of a Local Board unless he resided within the district or within seven miles thereof.

Answers to interrogatories were put in, showing the defendant admitted acting as a member of the Board.

For the defence it was contended that the defendant resided within the district. The defendant was called, and said that in consequence of a domestic difference he went in 1878 to live with his son-in-law, who resided within the district. He then went to Burton-on-Trent, but still kept his sitting room and bedroom at his son's house, paying 10s. per week for them.

The jury returned a verdict for the defendant.

'FRESH MILK.'

William Skitmore, a purveyor of milk, Clapham, was summoned at the instance of the Metropolitan Board of Works for unlawfully neglecting to keep the milk store, as well as all fixtures and tables therein, in a cleanly condition. The defendant pleaded not guilty, but said that on that morning he had not washed the cans. Mr. Spencer who appeared to support the summons, said the defendant had contravened the Act, and he proceeded against him under the 10th regulation. Robert Reid, the inspector, said the defendant was a cowkeeper and purveyor of milk. He had a store for the milk, which the Board ordered him to provide. The inspector found the milk in the kitchen instead of the store. The kitchen was in a very dirty condition. There were dirty clothes, dirty lumber, and a water-closet in the kitchen. Two cans, containing the milk, smelt most offensively, and were close to the water closet. On one occasion he found milk in the water-closet. Mr. Sheil fined him £5 with 2s. costs, and said he was liable to a penalty of £10.

AN INVITATION TO ENTERIC FEVER.

Charles Watkins, the owner of licensed premises called the 'Carpenters Arms', situate at Charlton, Henbury, was summoned under the Public Health Act, 1875, for permitting the drains of his house to be so foul, as to be a nuisance injurious to health. W. M. Lowick, surveyor to the Barton Regis Sanitary Authority, proved that he found the privy full, cesspool in the back court nearly full, and the drains all choked. Dr. Davies, Medical Officer of Health, also gave testimony to the unhealthy condition of Haise Lane, and said it only wanted the importation of a single case of infectious disease there, to spread through all the houses. The well-water had been analysed, and a certificate from Mr. Horsley, County analyst, laid before the Bench, showing the water was badly contaminated with sewage. An order, with costs, was made on the defendant to abate the nuisance within ten days, and he was recommended by the Bench not to use the well-water for drinking purposes.

ADULTERATION OF QUININE.

At Greenwich, Henry Morton, chemist, Deptford, appeared to a summons, at the instance of the Greenwich Board of Works, under section 4 of the Adulteration of Food and Drugs Act, for having mixed tincture of quinine with ingredients or materials so as to affect injuriously its quality or potency, by which he had rendered himself liable to a penalty of £50. Mr. Corden, inspector under the Board, said he went to the defendant's shop and asked for three ounces of tincture of quinine, for which he paid 1s. 8d. He divided it into three parts, and told the defendant it would be analysed by the public analyst. While he was getting the sealing wax from his pocket the defendant took two of the bottles containing the samples and threw them away. He offered to mix him up some more, as he said he had made a mistake and put six grains instead of eight to the ounce, but the witness took the remaining sample and told him he should report the matter. The magistrate was handed the certificate of the public analyst, Mr. Wigner, showing that the sample was more than 60 per cent. deficient, some other comparatively worthless alkaloids being added. Mr. Marsham fined the defendant £5, with £1 costs.

PUBLIC HEALTH (WATER) ACT.

At the Police court, Tunbridge, Mr. William Allcorn, a builder, of Shipbourne, was summoned under the provisions of the Public Health (Water) Act, for allowing a house to be occupied without first having obtained a certificate from the Rural Sanitary Committee of the Malling Union that there was a good supply of water. The defendant said that he did not know about the Act, and he had never received the notice sent by the Inspector, and he had made a good water supply. Mr. Wagon, the inspector, said that he had not been to the place to see whether there was a water supply, as it was an offence under the Act to allow the house to be used without obtaining the certificate. The Bench said that a good many Acts were passed of which they knew very little. The Inspector ought to have seen whether there was a proper water supply before he took proceedings, and for not doing so his costs would not be allowed. The defendant would be fined 1s. and 9s. costs.

THE SPREAD OF DISEASE.

Walter Sharland, a broker, appeared to an adjourned summons, taken out by Inspector Stevenson, on behalf of the Vestry of Camberwell, for having unlawfully and without disinfection, transmitted a feather pillow and a blanket which had been exposed to infection from small-pox. The evidence adduced showed that there was a bill of sale upon some goods at a house which the defendant seized under that instrument, and, notwithstanding he was told that a man was in the house suffering from small-pox, he caused to be removed a pillow and blanket from the room the sick man was in. These articles, together with other goods, were removed to a sale room, and there disposed of under the auctioneer's hammer. Mr. Ellison ordered the defendant to pay a fine of £5, and £2 2s. costs.

A POINT UNDER THE ADULTERATION ACT (SEC. 18).

A milk dealer named Martial, appeared to a summons before Mr. Saunders, for selling adulterated milk. Mr. Massey, for the defendant, said he had to make an objection which he thought was fatal to the case being proceeded with. According to the 18th Section of the Act, a certain form of certificate was to be given by the analyst, in the schedule of the Act the following words are appended: 'In the case of a certificate regarding milk, butter, or any article liable to decomposition, the analyst shall specially report whether any change had taken place in the constitution of the article that would interfere with the analysis.' The certificate of Dr. Bernays (produced) merely stated that the milk was adulterated to the extent of eight per cent. with added water. He therefore contended the certificate was not sufficient without the words which he had quoted, and the summons must be dismissed. Inspector Mackay, on the part of the prosecution, said such an objection had not before been raised. Mr. Saunders said he was of the opinion put forward by Mr. Massey, and upon these grounds dismissed the summons.

BRIEF NOTES OF USEFUL CASES.

PARLIAMENTARY EXPENSES.

1879. *A. G.* v. *Lower Thames Valley Sewerage Board.* Board constituted under Provisional Order for sewerage purposes—Funds raised under aforesaid powers employed in expenses of a Bill in Parliament to extend powers—*Per* Jessel, M.R.:—Funds intrusted by Parliament to a public body for a definite purpose must not be used for another purpose only auxiliary or incidental to the specific purpose—Held that Defendant Board had no right to apply to Parliament without the sanction of the Local Government Board—Injunction granted to restrain application of funds to payment of Parliamentary expenses. (*Times*, July 19, 1879.)

BUILDING BY-LAWS.

1880. *Brown* v. *Harrison.* Breach of By-Law—Definition of "person erecting" a new building—Contractor summoned, though a sub-contractor was the person actually guilty—Held that the contractor was a proper party to be proceeded against. (At Q. Sess.) (44 J.P., 90.)

ARTIZAN DWELLINGS.

1880. *Carr* v. *Metrop. B. W.* "Artizans' Dwellings Act, 1875," Sched., pars. 5-13--Circumstances under which arbitrator has power to remedy a technical informality. (*Times*, Feb. 10, 1880.)

COMMONS.

1880. *De Morgan* v. *Metrop. B. W.* "Metropolitan Commons Act, 1866," s. 6: "Metropolitan Commons Supplemental Act, 1877."—By-Law prohibiting speeches, lectures, sermons, or addresses, on a Common without the written permission of the Board held *intra vires*, and appellant rightly convicted of a breach of such By-Law. (49 L.J., M.C., 51; L.R., 5 Q.B.D., 155; 42 L.T., 238; 44 J.P., 296.)

RATES.

1879. *Kenrick* v. *Guilsfield Churchwardens.* "Rating Act, 1874," s. 6, sub. 2.—Where an owner has demised sporting, retaining the land, the sporting right is "severed" from occupation. (49 L.J., M.C., 27; L.R., 5 C.P.D., 41; 41 L.T., 624; 44 J.P., 202.)

SCAVENGING.

1879. *London General Omnibus Co.* v. *Mead.* Action against a scavenger for storing and sifting dust and refuse so as to be a nuisance—Proceedings before Jessel M.R. abandoned on defendant undertaking not to carry on his business so as to be a nuisance, and agreeing to pay costs. (*Times*, Dec. 10, 1879.)

BUILDING BY-LAWS.

1879. *Parsons* v. *Timewell.* "Metropolitan Building Act," 18 & 19 Vict., c. 122, s. 46—Skating Rink sanctioned on condition that owner removed it within two years—Undertaking to do this given by owner—On breach of the undertaking, held that no summary power was vested in a Magistrate to order its removal as an unauthorised building—The statutory powers to that effect only applied to buildings which were in course of erection and without due authority. (44 J.P., 296.)

RATING OF INSTITUTIONS.

1879. *Reg.* v. *Institution of Civil Engineers.* 6 & 7 Vict., c. 36, s. 1—A society whose primary object is the advancement of science for the benefit of a particular profession is not a society instituted for science "exclusively", and consequently is not exempt, notwithstanding that a certificate has been granted to it. (49 L.J., M.C., 34; L.R., 5 Q.B.D., 48; 42 L.T., 145; 44 J.P., 265.)

RECOVERY OF RATES.

1880. *Reg.* v. *Price.* The "Summary Jurisdiction Act, 1879" does not alter the previous law as to the recovery of Poor Rates, and the issue of Distress Warrants. (49 L.J., M.C., 49; L.R., 5 Q.B.D., 300; 42 L.T., 439; 44 J.P., 248.)

INTERPRETATION OF STATUTES.

1879. *Walsall Overseers* v. *London & North Western Railway Co.* "Public Health Acts, 1872 and 1875:" Local Acts—Rating privilege created by statute—Statute repealed in part, but no mention made of the Rating privilege in question—A privilege granted by statute cannot be taken away without a direct repeal of the statute, or an inference so strong as to authorise a Court to say that the two statutes cannot stand together—Rule quashed. (48 L.J., M.C., 166; L.R., 4, App. Cas., 467; 41 L.T., 106; 43 J.P., 748.)

RATE.

1879. *St. Werburgh's Overseers* v. *Hutchinson.* Where an outgoing tenant quits premises before the expiration of the period for which a Rate is made, and is not followed by an incoming tenant, the outgoing tenant is liable for the whole Rate, and the "Assessed Rates Act, 1869", 32 & 33 Vict., c. 41, s. 16, is not available to relieve him. (49 L.J., M.C., 23; L.R., 5 Ex. D., 19; 42 L.T., 153; 43 J.P., 785.)

LIABILITY FOR ACCIDENTS.

1879. *Stringer* v. *Barker*. "Public Health Act, 1875," s. 264—Sewer constructed by contractor—Accident to horse—Contractor held not entitled to notice of Action—The enactment in question is narrower in its tenour than the corresponding enactment in the "Public Health Act, 1848". (W.N., 1879, p. 127.)

CLERK.

1879. *Swansea, Mayor* v. *Quirk*. Interrogatories—Corporation answering by their Town Clerk as Solicitor—Privilege—Held that under the circumstances the privilege claimed for the Town Clerk could not be allowed. (49 L.J., C.P., 157; L.R., 5 C.P.D., 106; 41 L.T., 758; 44 J.P., 378.)

HIGHWAYS.

1880. *Williams* v. *Ellis*. Highway—Turnpike—Special Act, 3 Will. IV., c. lv.—Bicycle held not to be a "carriage". (49 L.J., Q.B., 47; L.R., 5 Q.B.D., 175; 42 L.T., 249; 44 J.P., 136.)

REVIEWS.

A Few Remarks on the Necessity for Further Suppression of Infectious Disorders: Fevers. By DONALD MURDOCK, M.R.C.S., Stamford.

THIS short *brochure* is likely to be useful, as it gives concisely the chief reasons in favour of an extension of the powers already possessed by Sanitary Authorities for the suppression of infectious diseases. Mr. Murdock, who is not officially engaged in sanitary work, and whose opinion may therefore be deemed unbiassed, points out that except for the lodger classes of the community, and for these only under certain circumstances, no compulsory action can be taken for the removal of those who are likely to spread these diseases.

The scope of the work is contained in the following short paragraph: 'I will now proceed to quote the Acts, and to show their insufficiency; then the necessity for something better; and, in continuation, the discussion of the question will lead me to speak of the alterations I recommend.' In considering the Acts, he states his opinion, contrary to that generally entertained, that the words 'without proper lodging or accommodation' include every one who cannot be completely isolated in his own house, and dwells on the difficulties in carrying out this procedure. He, therefore, proposes that notice shall be given to the Local Sanitary Authorities of the occurrence of infectious disorders by the medical attendant, or, if there be none, by the person in charge of the sick; that the disinfection of the rooms shall be executed by the sanitary authorities; that every person who has so suffered shall forward a certificate of recovery to the sanitary authority before associating with the community; and that regulations for the hygiene of the sick-room shall be delivered by the sanitary authority to those in charge. Also, that all those in charge of patients thus affected should use disinfectants before mixing with others.

The proposal that in every instance the disinfection of premises, bedding, and clothes shall be done by the sanitary authority is of considerable value, as instances of injury to health by imperfect disinfection are by no means infrequent, partly in consequence of a so-called disinfectant which is not a germicide being used, or an insufficient quantity of the disinfecting agent being employed; and partly, also, from the exposure of the infected articles for too short a time. The experience of most sanitarians is that when articles are properly disinfected by heat and sulphurous acid (the fumes of burning sulphur) they may be safely returned to their owners, and that, therefore, there is no necessity for the destruction of infected clothing, etc. Although we do not agree with Mr. Murdock in all his opinions, and in everything he advocates, yet we can safely advise the perusal of his pamphlet by those who are interested in the present state of sanitary legislation.

Health Lectures for the People; the Ventilation of Houses. By H. ASHBY, M.D.

This is a very useful little tract and very practically treated, inasmuch as the author has recommended nothing in the shape of appliances for improving ventilation save such as he has himself tried and experimented with.

There are a few paragraphs upon the effects of impure air upon health, upon the composition of air vitiated by respiration, and upon the air vitiated by combustion, which are especially to the point, and which are so written as to be easily understood by the people. There is also a chapterlet upon the way to supply fresh air to our rooms, and a description of inlets of air and filtering the air supply. Among the outlets recommended, is one which was first described in our 'Sanitary Dictionary'. A few lines upon the ventilation of bedrooms close the little work. There are some few woodcuts illustrative of the text, which are very easy to understand and will be appreciated by those desirous of becoming acquainted with sanitary truths.

Nature's Hygiene; a Series of Essays on Popular Scientific Subjects, with Special References to the Chemistry and Hygiene of the Eucalyptus and the Pine. By C. T. KINGZETT, F.C.S. Ballière, Tindall, and Cox. 1880.

MR. KINGZETT'S work is essentially a treatise on peroxide of hydrogen, with special reference to the sanitary value of this agent as a disinfectant. It is, at first sight, somewhat difficult to understand why the present title should be given to this book.

The value hitherto assigned to oxygen and its allotropic form ozone is, according to Mr. Kingzett, incorrect, and we are indebted to peroxide of hydrogen for many of the benefits which accrue to us, and which were believed to be the result of pure air and ozone.

The difficulty in discriminating between ozone and hydrogen peroxide has, no doubt, led to many errors, and it is comparatively speaking of late years that the researcees of eminent chemists have demonstrated the presence of this liquid in the air. The subject is yet in its infancy, and we are greatly indebted to Mr. Kingzett for a mass of valuable information, which is thoroughly well put, and in a readable form.

Mr. Kingzett enters largely into the subject of infectants and contagious disorders, embracing a description of the germ and other theories of infective diseases. He tells us 'all the water and air we drink and breathe swarm with the germs of the three natural groups of the lower fungi, viz., the mould fungi, the sprouting or yeast fungi, and the fissiparous fungi, or bacteria'. In his book, Mr. Kingzett seems to draw no distinction between fungi and bacteria, whereas they are wholly distinct; true bacteria exhibit no tendency to bud or branch; their

only known mode of reproduction is by transverse cleavage, and this at once places them in a separate list; they are, in fact, extremely closely allied to the ossillatorians, and are quite distinct from fungus germs.

Again, Mr. Kingzett is sceptical as regards the germ-theory of disease, as now generally accepted, but from a close perusal of his book, we fail to detect one particle of evidence in favour of any other theory; nay, while Mr. Kingzett overlooks the experiments of Chauveau, Braidwood, and Vacher on vaccine matter, which, to our mind, prove conclusively the particular nature of the contagia, so far as vaccine matter is concerned, he does not supply us with any substantial evidence in favour of the theory he prefers, namely, 'that the specific contagia of the fevers and other infective diseases may be degraded forms of bioplasm'. If these forms are organised, how are we to differentiate them from disease germs so-called?

Part of the latter sections of this work are devoted to a history of the eucalyptus globulus, and the beneficial results which have accrued from the cultivation of this tree. The eucalyptus globulus was discovered by Labillardière in Tasmania towards the close of the last century, but until of recent years its properties have not been understood or known to Europeans. The testimony in favour of its antimalarial power is very strong, and in marshy districts, where this tree has been planted, fever has almost disappeared.

In Algeria, large tracts of land have been rendered healthy by planting and cultivating the growth of the eucalyptus, and as the trees grow fever diminishes in frequency and intensity. Again, near Rome, we hear of similar beneficial results; but whether the benefit is due entirely to the development and diffusion of hydrogen peroxide is, we think, extremely doubtful. Much more, we think, is derived from the effect its rapid growth has on lowering the subsoil water and keeping it at an unvarying level. Very similar results, we know, were obtained in this country by permanent subsoil drainage.

Mr. Kingzett quotes the results and experience of Dr. Day, of Geelong, on the power peroxide of hydrogen possesses of oxidising and annihilating the poisons of small-pox and scarlet fever. The treatment of diseases of this type by anointing the whole surface of the body with oil, was first suggested by Dr. Wm. Budd of Bristol, and was eminently successful in our hands during a large and somewhat severe epidemic of scarlet fever. The object of thus treating the subjects of these diseases is to prevent the spread of infection from the cutaneous surfaces; it also protects against cold to a slight degree, but whether peroxide of hydrogen, carbolic acid, or camphor is added to the oil, is, in our experience, a matter of indifference. To speak of this substance, when applied externally, curing scarlet fever, is simply absurd.

The concluding portion of Mr. Kingzett's work is devoted to the results of a series of experiments with Sanitas solution. These experiments are extremely meagre, dealing as they do with only the physical characters of the fluid acted upon. No attempt has been made to ascertain what effect this solution had on the bacteria present in the liquid—in fact, the microscope was not resorted to, and, according to our experience, any series of experiments in this direction, which does not include a careful microscopic examination under a high power, fails to give us just that information which is most essential to enable us to arrive at any trustworthy conclusion. We maintain that it is only by careful microscopic examination that we can obtain any definite information of the least value.

In our own experiments we found, with a strong solution of Sanitas added to an infusion of linseed meal swarming with bacteria, that after the lapse of several days the bacteria were extremely active and excursive, that they were present both in the free and zoogloea form, that there was no precipitation, but, on the contrary, the rods appeared to be very much lengthened. We were here dealing with a solution which certainly was no disinfectant in the true meaning of that term.

The aromas of plants have ever been held to be beneficial, and it has been a constant habit for people to carry these about them during epidemic visitations; but these have latterly become somewhat in disrepute. Whether they are disinfectant at all is questionable, but that they possess certain antiseptic properties is conclusively proved by the experiments of Mr. Kingzett and others.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

WATER-SUPPLY TO LARGE COMMUNITIES.

An article headed 'Water-Supply to Large Communities', which appeared in your August number, has already borne fruit. You will see from the following Memorial from a body of large property owners to the Mayor, Aldermen, and Burgesses of our city, that they quote from it freely and with good effect. I hear that a public meeting is shortly to be called to check outlay connected with the Vyrnwy water scheme, an Act for which has been recently obtained. We in Liverpool can, like the inhabitants of Manchester, do without obtaining water from an expensive source, till the saving of interest on such outlay will go largely towards the carrying out of some distant scheme when required. I hope other communities will take up the subject of pure water-supply with the spirit which will be shown in Liverpool.

THOMAS J. ROBERTS.

MEMORIAL.

To the Mayor, Aldermen, and Burgesses of the City of Liverpool in Council assembled.

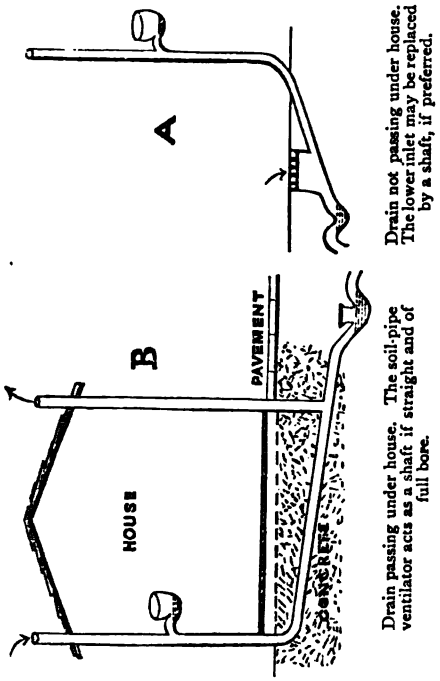
The respectful Memorial of the Liverpool Land and House Owners' Association sheweth, that your Memorialists direct attention to the fact that a very large sum of money has already been expended out of Local Taxation to widen the entrances of passages and courts, as well as to construct trough closets in place of ashpits; that it is now proposed to spend a further large sum of money pursuant to a presentment of the Grand Jury at the last City Sessions to demolish houses and portions of property; and, besides, it is proposed to expend £15,800, being the cost of fixing lamps for the lighting of 2,560 courts. Your Memorialists humbly submit that the time has arrived for the demolition of all the old houses and courts in the lowest districts and for the reconstruction of old Liverpool. And, afterwards, that the land should be laid out in wide streets and boulevards, to the fronts of which four-roomed cottages, dwelling-houses, shops, offices and mansions can be erected under restrictions by the City Council. Your Memorialists are of opinion that such a change should be made on the basis of the Schedules of the Income and Property Tax, so that the whole wealth of the City should contribute to the Improvement. The amount derivable by that means would, at 1d. in the pound, produce sufficient to pay interest on a capital sum of £1,800,000, a sum amply sufficient to reconstruct the City, with the purchase monies on re-sales of lands, etc. A substantial improvement as suggested would reduce the death rate and Local Taxation, whereas the past peddling with some few neighbourhoods only, has had no marked effect upon the health of the City, is a continual burden upon the Ratepayers and Property Owners, and produces no corresponding benefit for the outlay. Much of the property 'improved' has already been pulled down, after large sums have been expended upon it only recently. And other large similar blocks of houses have to be pulled down after similar expenditures upon them, under the last Improvement Scheme. As supporting the above suggestion your Memorialists refer to an Article in the SANITARY RECORD of this month, which states: 'That the Registrar General's return of deaths in the largest towns shows Liver-

pool at the bottom of the List for years back. That Liverpool possesses natural advantages as regards health over most large towns.' Few towns in England are so well situated for the carrying out economically all that is necessary for the health of the inhabitants. That the cost of the proposed Water Scheme is far in excess of what would be required to make Liverpool a model city, as regards water supplies and their distribution for all domestic, trade, and sanitary purposes, the reconstruction of its defective sewers and the sweeping away of much of the Cottage property which now stands upon ground sodden by leakages from defective sewers. Your Memorialists respectfully suggest that application be made in the next Session of Parliament for a Bill for powers to make improvements in the manner suggested; to raise a fund for that purpose repayable by taxation upon the basis of the Income and Property Tax Schedules; and that no expenditure in the meantime be incurred until such application shall have been made. And your Memorialists believe that no Ratepayer, or a Committee of the House of Commons, would object to such a Bill, the object being to reduce the high death-rate in the City of Liverpool.

Liverpool, 28th August, 1880. WALTER PIERCE, President.

SOIL-PIPE AND CLOSET APPARATUS VENTILATION.

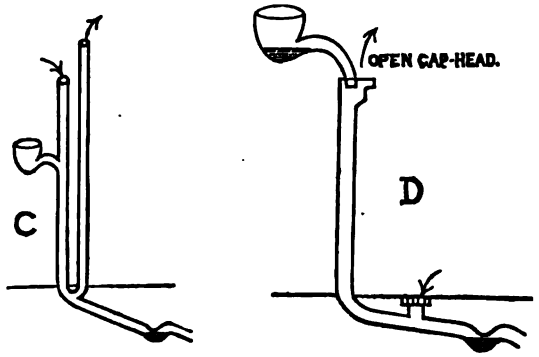
As you invite comments (in an editorial note to a letter from Mr. May, jun., M. O. H. for Devonport) on the best methods of ventilating soil-pipes and closet apparatus, I venture to send you some sketches and remarks on the subject, based on a considerable experience in the matter. The drawing given by Mr. May simply represents a 'hopper' pan and S trap beneath, and there could, of course, be no use in a ventilator on the pan side of the trap, as suggested by the 'practical plumber' he mentions. The proper mode of dealing with such a case is to ventilate the soil-pipe, as Mr. May proposes, by a straight pipe of the same bore as the soil-pipe (or at least four inches diameter); but an *air current* should be established in such soil-pipe in one of the methods hereunder indicated.


A
Drain not passing under house. The lower inlet may be replaced by a shaft, if preferred.
B
PAVEMENT
HOUSE
Drain passing under house. The soil-pipe ventilator acts as a shaft if straight and of full bore.

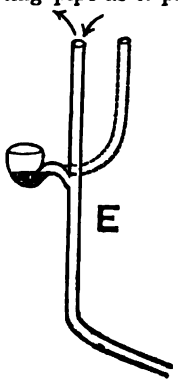
The tendency for air-currents is down the short and up the taller shaft. By adopting one of the methods, A or B, for ventilation of soil-pipes and drains, the requirements of the Local Government Board Model By-Laws are complied with. By those by-laws it is provided that the soil-pipe shall be four inches in diameter, to be fixed *outside* the building, and be continued upwards, without diminution of its diameter, free of all avoidable bends or angles, ending in a safe position above the eaves (see section 66 in the Model Code); and it is further required that a means shall be provided for securing a constant current of air in the soil-pipe by shafts and openings, as shown in the diagrams A and B. Thus, the house-drain and soil-pipe are ventilated *per se* by a constant current of fresh air, and the sewer is trapped off, depending for its ventilation on the road grids, or special shafts, as the case may be. It is obviously not deemed advisable by the central authority to make the house-drain ventilators serve as sewer ventilators, and in this view I entirely concur. These model by-laws are very carefully and well thought out, and embrace exceedingly sound principles for house drainage and closet arrangements generally.

The Model Code provides that if a drain passes under a house it shall be laid in concrete and be ventilated at both ends, as shown in fig. B (see sect. 62), the soil-pipe ventilating pipe being deemed one shaft for such purpose (see sect. 65, v). No trap must be put in the soil-pipe nor at its foot (sect. 66), but in the line of run of the drain (sect. 65), as far from the house and as near the sewer as practicable (sect. 63), so that a good flush of water will sweep the drain, for which purpose it is best to get the sink-water and bath-water entrances well to the house side of such trap. The whole of these provisions are directed to the object of a constant circulation of air in the house-drain and soil-pipe, and the exclusion of the sewer air from such house-drain.

The following diagrams, C, D, and E, show other methods of ventilation for soil-pipes, the least effective being E, which does not always establish the double current, and if small often acts as a mere inlet for cold air into the closet, carrying foul air from below with it. The soil-pans here drawn are



merely diagrammatic, and nine out of ten soil-pipes are inside buildings involving a curve in the ventilating pipe as it passes through the wall. These diagrams presume that the soil-pipe passes out through the wall, and then down outside.



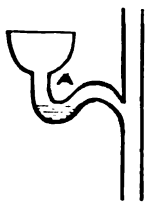
C. This plan is the basis of Banner's system, and acts well if properly carried out on that system, or even as here drawn, without suction cowls.

D. This plan is, I believe, adopted by Norman Shaw. It cuts off connection of soil-pipe and drain well.

E. This is the plan in common use. The ventilator is often far too small, and is then useless. The dotted lines indicate the ventilator from a soil-pipe inside the house.

K

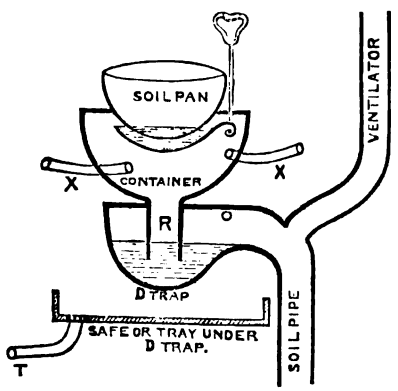
Mr. May's drawing merely represents a 'hopper' pan with a syphon beneath, and is, I presume, merely diagrammatic, for no one would surely suggest ventilation from the point A under a common hopper. With regard to soil-pans, no pan of the hopper class that contains water *only* in the trap beneath should be fixed in a house. These hoppers 'accumulate filth largely'. Fæcal matter should always drop *direct* into water, and good soil-pans permit the filth received to fall clear of the sides. The Model By-Laws provide for this, and state that the pan or basin shall be of 'non-absorbent material', and of such 'shape', 'capacity', and 'construction', 'as to receive and contain a sufficient quantity of water', and to allow all filth which may be deposited therein to fall 'free of the sides' of the pan, and 'directly' into the water in such pan (sect. 69). This provision ensures cleanliness of the pan, and is secured by the Underhay, Jennings, Bostel, and Wash-out closets. A good soil-pan should be *smooth* glazed white earthenware, and the principal forms of closet apparatus are either pan, plug, valve, or plain. Unfortunately, a large number of closets exist with 'copper-pan', 'container' and 'D' trap—a form of closet apparatus much condemned, because it accumulates filth, and the D trap acts as a 'little cesspool', often very imperfectly flushed.



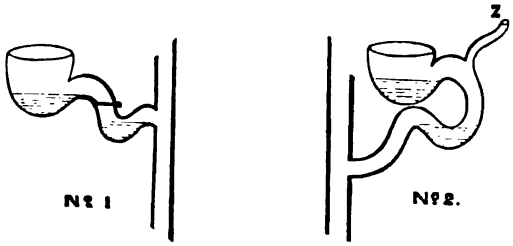
The Model Code provides that no person 'shall construct or fix under the pan or basin any "container" or other similar fitting'. It further says no person shall 'construct or fix in, or in connection with, the water-closet apparatus any trap of the kind known as a D trap' (sect. 69). This seems rather rigid; but such an apparatus is so badly adapted for effectual flushing that it is a most advisable clause for all new houses.

Most good soil-pans are now made 'rim-flushing', and those are most effectual that divide the stream of water, causing the divided streams to meet in front, and then dash in cascade form into the pan, so washing out the pan and trap below with a rush.

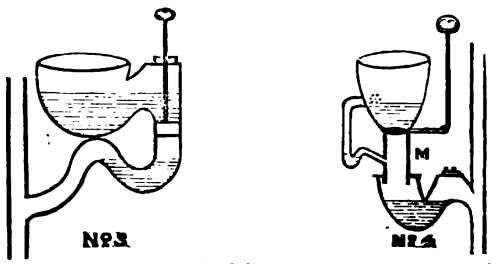
If a 'container' and 'D trap' closet exist, not only should the soil pipe be ventilated, as shown in the diagrams A, B, C, D, E, but the 'container' should also be ventilated by *two* short one-inch lead pipes, x x, *terminating in the open air*, so as to secure a current of air in the container.



The above is the old-fashioned complex closet apparatus, ventilated according to modern views. It is important no aperture should exist at O, as is sometimes the case, but there is no objection to an *extra* ventilator from that point. The tray-pipe, T, must go direct to the open air, and under no conditions end in the soil-pipe, as is often the case. The dip-pipe, R, should dip below the water line in the D trap; sometimes it does not do so. The ventilation of the D trap is secured if the soil-pipe ventilator is properly arranged. The soil-pipe ventilation is by far more important than relief above the S or D trap; but in certain cases, if there is, say, double trapping without ventilation, short additional pipe ventilators may be of use. The chief types of closet-pan, and the mode of securing their ventilation, are here shown (in diagram form).



No. 1 and No. 2 are of the Wash-out and Bostel type; the pipe Z is really not needed. No. 3 is of the 'plug' or Jennings type: if no trap exists under



the plug, they are called 'trapless'. No. 4 shows the 'valve', Underhay type, with an overflow from the soil-pan: if there is a long space between the underside of the valve and trap below, a short ventilating pipe at M to the open air is useful in addition to the soil-pipe ventilator. In 'plug' and 'valve' closets, if paper sticks about the valves or plugs, or if they get foul, the pans do not retain the water, but the trap below still 'seals'. The above diagrams show fairly the types of soil-pans now in use.

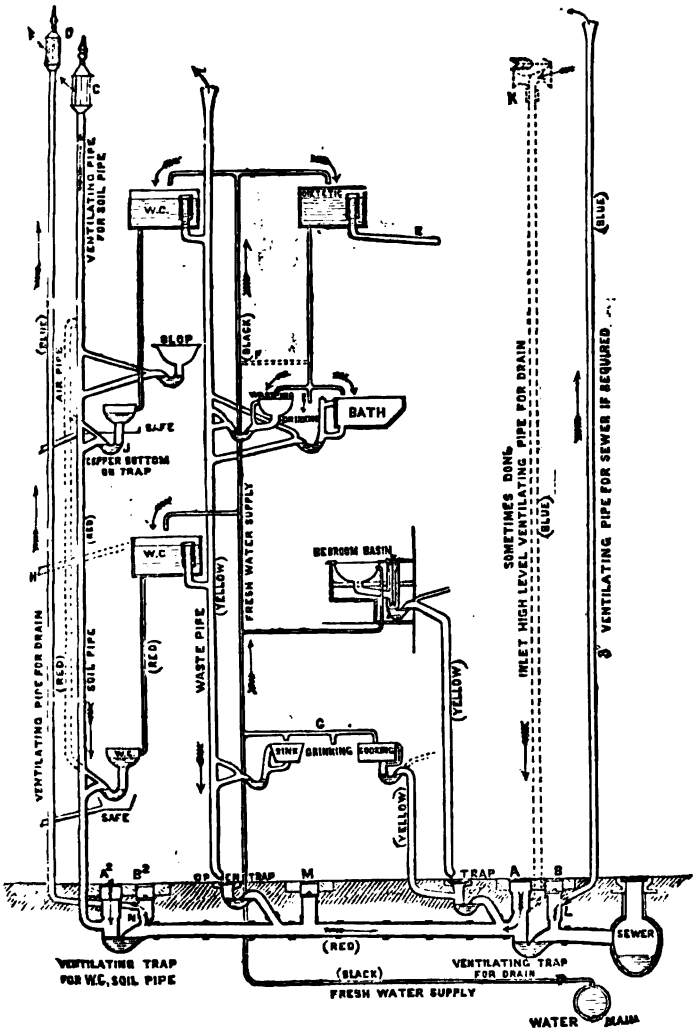
JOHN SHEA, M.D., B.A., etc.,
Medical Officer of Health, etc.

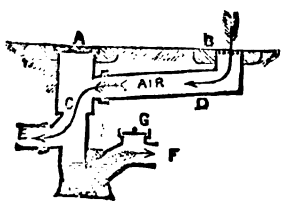
Reading, August 20th, 1880.

'Why don't you call your girl Oleo-Margarine?' asked a friend of a well-known patentee. 'Well, perhaps I might,' was the answer, 'if I had n't any but her.'——Messrs. C. H. Sharp and Co., of 104 Newgate Street, have received orders for their 'Crown Ejector' for the ventilation of the Imperial Yacht, *Livadia*.——The semi-annual report of the Registrar of Vital Statistics in New York, during the half-year ending July 1st, shows an annual death-rate of 25.26 in every 1,000 of a population estimated on the basis of the recent census, at 1,206,561. This death-rate is much higher than that which prevails in London.——At the Manchester Police Court, a milk dealer named Mellings was fined £20 and costs for selling adulterated milk. It was stated that this was the eighth time he had been convicted for the same offence, and that he had already paid no less a sum than £110 in fines, besides the costs of the several prosecutions.

THE VENTILATION OF SOIL-PIPES.

Mr. May's drawing and his words at page 78 scarcely agree. In the drawing, the 'A' is placed as if the plumber meant the branch air-pipe to come off the inside of the trap, whereas I would judge from the wording that the plumber meant the air-pipe to come off the top of the out-go of the trap. To put in any sort of air-pipe from 'A' on the style of closet shown would be absurd. Good plumbers not only carry up the vertical soil-pipe above the roof, but they also provide for the ventilation of the branches. It is bad plumbing when the ventilation of the branches is not provided for, especially if these branches are one or more feet long. In my letter on the 'Waste of Water', a simple illustration is given for soil-pipes only. This one shows the whole of the water-supply going into the house from the water-main to its discharge through waste- and soil-pipes and drains to the sewer. In some cases, where a ventilating drain-trap happens to be placed too close to a door or window for the fresh air grating to be placed right above the trap, as at A and A^2, then a close iron lid is placed right above the trap, as at A





in small sketch, and an air-pipe, D, put in from off the side of the trap, in the direction and to the distance suitable, the fresh air entrance grating being put on as shown at B. In some cases, instead of this grating being set horizontally as at B, it may be placed vertically into a wall, and the air-pipe put in to suit, and so on. I need say no more at present, except to add that these plans are drawn out upon the principle of leaving no portion of either drain, soil, or waste-pipe unventilated; neither are they mere unworkable theoretical fancies, but what I am really in the habit of carrying out in practice. I should be glad to see other practical parties giving us full *drawings* of their plans as actually carried out.

W. P. BUCHAN.

As you invite correspondence, allow me to say, as one who has for the past twenty-five years had considerable experience in these matters, that I quite agree with Mr. May, M.O.H. for Devonport, that the soil-pipe and ventilator-pipe as described by him should be of the same dimensions, or as near as possible to the soil-pipe, and that an open air-grate, or pipe and horizontal trap similar to 'Buchan's' or the same should be placed between the air-pipe or grate and the main sewer. I have adopted this plan for years, and found it to answer admirably. Referring to Mr. May's sketch, I cannot conceive how a pipe at A can ventilate the bend at all as shown, as it is trapped between A and soil-pipe bend connection to soil-pipe, and I would refer Mr. May to sketch B I have sent this week in reply to Mr. Bennett of Liverpool, whose recommendations show a soil-pipe without any ventilation at all, neither does he consider it necessary. It will take time to educate and convince men like Mr. May's plumber and the public generally of the importance of rightly applied systems of ventilation; not draughts both for water-closets and living rooms. No water-closet should be allowed to be fixed at all, unless approved by the Sanitary Authority, who should set out how the works should be carried out in all cases. I quite agree that all complicated machinery is altogether unnecessary, and sound highly glazed plain Hopper closets and S trap complete, with flushing rim when properly ventilated, are as good as most appliances to be had, and the cheapest. Plugs, iron pans, receivers, as the old pan closet automatic regulators, etc. etc., are some of them worse than useless, expensive, and soon get out of order. Regulating cisterns with ball-taps can be put to

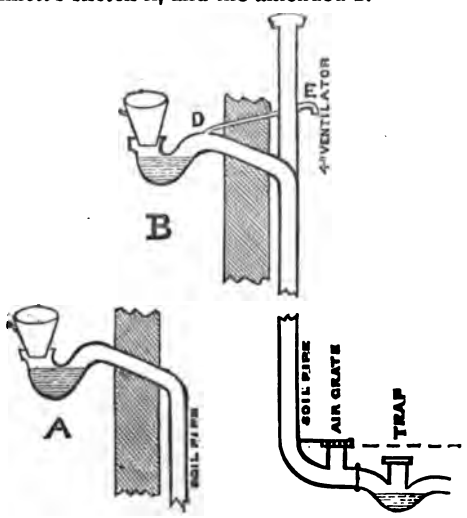
towns' supply, and if no towns' supply an ordinary service box and valve can be used. Jenning's Hopper Closets with flushing rims can be procured of any desired pattern or shade, and answer the purpose admirably. The old pan closets are an abomination especially when D or helmet traps are used.

Goole, August 24th, 1880. E. C. B. TUDOR.

WASTE OF WATER.

I hope that for the enlightenment of your readers, Mr. William Bennett will kindly explain how the use of a water-pail for closet-flushing, as described by him at page 76 of the August number of the SANITARY RECORD, can be supposed to affect the necessity for soil-pipe ventilation. I have read his letter more than once, but I fail to see how the substitution of a pail for the ordinary (and preferable) cistern supply can render ventilation needless, especially under the circumstances named, *i.e.*, the 'four-inch soil-pipe communicating directly with the sewer'. JOHN S. HODGSON.

I notice in your issue of this month, p. 76, Mr. W. Bennett of Liverpool has given sketches of two cans and water-closet, which he says are 'for flushing all water-closets constructed on the principle of having the common water-trap attached to the foot of the basin, and connected to a four-inch soil-pipe; and he says the sketch showing my arrangement will explain my views,' and further he says 'with this arrangement no mechanical appliances are required or ventilation requisite'. Surely such mistakes should not be allowed to go forth to the world as an acknowledged fact in this enlightened age of sanitary science without explanation, especially when such efforts are being made in the courts and alleys of Liverpool, by men who profess sanitary science. We will take Mr. Bennett's sketch A, and the amended B.



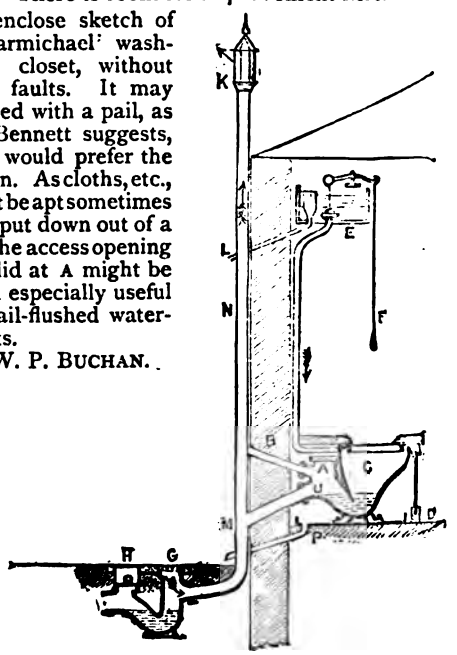
Mr. Bennett's sketch shows a soil-pipe running direct to the main sewer, and devoid of any provision for ventilation; therefore, if he has already had 1100 cans 'distributed to the tenants in sundry courts' in Liverpool, and making the tenants believe his cans were supplying all that was necessary in a sanitary point of view, and that no ventilation was required, he has been allowed to pursue a very dangerous course, and it is a pity the Sanitary Authorities have not been made aware of it. Mr. Bennett shows no ventilation to his soil-pipe, and it may be presumed the gases are bottled up in the soil-pipe direct to drain; therefore at any time the water in the trap may be liable to be syphoned out and the trap left dry in the night time when no cans can be at work. I do not say Mr. Bennett's cans may not induce people to put more water down the closet where it can easily be procured, but surely he does not hold a water-closet is in a proper sanitary condition without efficient ventilation. I refer him to my rough sketch B, a plan which I have found to answer without the extra aid of water-cans. In many cases the pipe D-E may be used where the basin is some distance from the ventilating pipe.

Goole, August 23rd, 1880. E. C. B. TUDOR.

Mr. Bennett's style of water-closet, described and illustrated pp. 76, 77, is scarcely so perfect as he asserts. In the first place, its 'communicating directly with the sewer' is dangerous, more especially as the soil-pipe is unventilated, and he refers to the trap requiring 'recharging'. In this case, if the trap were not properly recharged, the air from the common sewer would blow out freely; or if any opening occurred in the soil-pipe it would come out. This is wrong. Further, the mode of junction of the trap and basin is bad, inasmuch as the basin dips several inches into the water, and the inner side of the trap at its top is as low as the top of the water in the trap. There is room for improvement here.

I enclose sketch of a 'Carmichael' wash-down closet, without these faults. It may be used with a pail, as Mr. Bennett suggests, but I would prefer the cistern. As cloths, etc., might be apt sometimes to be put down out of a pail, the access opening with lid at A might be found especially useful for pail-flushed water-closets.

W. P. BUCHAN.



Some very excellent suggestions on the Construction of Sanitary Appliances have from time to time appeared in the pages of the SANITARY RECORD, but the water-closet system and its 'one gallon can' flushing, which Mr. Bennett (on page 77, August issue) recommends as the safest and least expensive of water-closets I think very objectionable, and for the following reasons. 1st. The Hopper pan, as shown in Mr. Bennett's sketch, is one of the most difficult pans to keep clean and free from objectionable matter; it requires a sudden downpour from a flushing

cistern so arranged as to well wash the pan. 2nd. Hand-flushing is not to be relied on; a large percentage of the users of water-closets, would neglect filling the can for flushing purposes. 3rd. One gallon of water is not sufficient for scouring power, neither would it drive the contents of the trap into the 'house drain'. Mr. Bennett also tells us that ventilation is not requisite, a fourth soil-pipe leading from the closet-pan and trap, and connected direct with the sewer. Surely this is not in accordance with our present ideas of sanitation, for without a ventilating pipe the closet trap would be subject to syphon action, thus leaving the house open to invasion from sewer air.

Eastbourne, Aug. 26th, 1880. W.G.

I have read with much interest the letter of Mr. Bennett in your last issue, dealing with the above subject, which is one to which I have paid great attention. The danger of all such contrivances as those which he brings under your notice is that among the poorer classes inhabiting the 'uncivilised quarters' of our large towns, so much apathy and carelessness respecting sanitary matters prevails that nothing short of an automatic system of flushing is permanently successful.

To meet this want I have found nothing to answer so well as a small tank of galvanised iron fitted with 'Field's Annular Syphon'. The peculiarity of this syphon is that it will discharge the tank with a mere dribble of water, and the supply from a tap can be so arranged as to fill the tank every hour. The size of the tank I advocate for single closets is two-and-a-half gallons, or for blocks I use larger tanks holding two-and-a-half gallons per closet. The action of the syphon tank is purely automatic: it is placed above the closet and discharges itself when full in a few seconds; thus ensuring a most perfect flush, and preventing all possibility of nuisance which would speedily arise from neglect in the use of Mr. Bennett's cans or any other appliance of that character, in connection with some simple trapped closet such as that called the 'Artisan', which I quite agree with your correspondent is the best form for the poorer classes. I have found this system to be productive of the most beneficial results.

H. BOWES SCOTT.

Broadway Chambers, Westminster,
August 23rd, 1880.

I see on p. 76 of the August number, a letter describing, with illustration, a simple and efficient form of water-closet, with which I cordially agree, but there is nothing new in it, as you will see by the following, copied from a valuable report, by Mr. William Pole, headed, 'Copy of all Reports made by Mr. William Pole to the Board of Trade and the Home Office in 1870 and 1871, on the Constant-Service System of Water-Supply'.

'*Water-closets in the Poorer Districts.*—The condition of the poorer districts of London in regard to these is peculiar, and different from that in any of the country towns I have visited. In consequence of the sanitary agitation which took place some twenty or thirty years ago, cesspools for the collection of night-soil have been abolished, and the soil-pans almost universally made to discharge into the drains. But in vast numbers of cases there is no water laid on to the closets, and the only means of keeping them clean is by pouring water down them by means of hand-pails.

'This process appears to be perfectly effective; the soil-pan is generally of earthenware, with a syphon bend for a trap, and a bucket of water thrown into it flushes it well out, leaving the trap sealed. No difficulty seems to be raised by the inhabitants about them; they generally throw their house slops down the closets, and in addition, once a day, or occasionally as may be required, a bucket or two of water added will keep the pan perfectly clean. The people seem to consider this as a part of their regular household duty, like any other domestic cleaning, and, though I have made repeated inquiries in every district I have visited, I have never heard any complaint of the trouble, or any wish for a change of system; nor (except in a very few cases of gross filthiness, where no plan would fare better) have I seen any such closets otherwise than in a clean and wholesome condition.

'In my opinion this fact gets rid of one of the greatest difficulties in the way of the introduction of constant supply. If every closet required to have water laid on, it would be no easy matter to accomplish; but, as it is, there is absolutely nothing to be done in this respect but to leave well alone.

'In some closets in the poorer districts an attempt has been made to bring water into them, not by laying it on, but by leading into the pan the end of an overflow pipe from a water-butt or cistern, or the discharge from a neighbouring sink. These contrivances are uncertain and ineffective; sometimes they produce no water at all, and, when they do, they give only a dribble of little use for flushing out the pan, and the people have generally to use hand-pails in addition. They should be done away with.'

These valuable reports were ordered by the House of Commons to be printed on March 12th, 1872. Every sanitarian ought to read them carefully. The flush-can, illustrated also in your correspondent's letter, makes the closet described by Mr. Pole perfect, and equally applicable for the palace as for the cottage. The cost is trifling, the action perfect, and the risk of getting out of order *nil*. So far for the construction of the water-closet; but the advantages do not end here, by adopting this kind of closet and flushing-can, not one drop of water can be wasted either by carelessness or disrepair, neither is it possible that the house cisterns can be polluted, or sewer smells introduced. The flushing, too, is so perfect that the drains between the closets and main sewers will be always kept thoroughly cleansed. So long as water-closets are tolerated no plan can be more free from risk than this. Where complicated and trough water-closets are in general use, five gallons is considered a fair allowance per head for use and waste, but with Mr. Pole's closet, and the flush-can recommended, one gallon per head per day is ample; this would, in a city like Liverpool, be a saving equal to four gallons a day per head, or to an eight year's further supply at the rate calculated upon, namely, half a million gallons per day extra for each year. This saving alone would in 1888 leave the supply and demand for Liverpool in exactly the same position as they stand at present, and justify a postponement of any new water scheme for that length of time, effecting a saving of interest, working expenses, etc., of at least £120,000 per annum.

GEORGE FFOULKES.

Liverpool, Sept. 8th, 1880.

RATS AND LEAD PIPES.

In reference to Mr. Eassie's remarks at page 76, I may say that in my business as a plumber, it is quite common to find the rats eating the lead pipes, both supply and waste pipes. They eat the latter

both from the inside and the outside. I had a curious instance of rats eating their way into a house I was in, about five years ago, through the top of the four-and-a-half inch lead siphon-trap of the water-closet. In this case I awoke in the middle of the night with a very disagreeable sensation as if being choked. I could not account for this, but as the water-closet was in the flat below, right under my bedroom, I suspected it, and opened the window full and left it so all night; went back to bed and fell asleep. Next morning I got the water-closet taken down and the floor lifted, when a hole two inches in diameter was seen cut by rats through the lead soil-pipe from within.* The hole was at once closed, and a trap being got one rat was soon caught, and in a few days after another. 'Burst pipes' are frequently caused by the rats eating the supply pipes. Mice, as Mr. Eassie says, often eat the gas pipes, and even block-tin pipes as well as composition. I cannot, however, see my way to agree with Mr. Eassie that the object of the mice in eating the gas pipes 'was evidently to get at the water which sometimes rests in badly laid pipes'; for so far as my memory serves me there was no water in the pipes in many cases, but I rather think that it was because grease had been dropped upon the part eaten, or in other cases because the pipe was in their way. Another idea is that the mice, if poisoned, might eat the pipe to cool their mouths?

W. P. BUCHAN.

21, Renfrew Street, Glasgow, 25th Aug., 1880.

* Had there been a fire-clay disconnecting trap outside at bottom of soil-pipe the rats could not have got in.

CREMATION OR BURIAL?

After hearing a paper on Cremation in the Section of Public Health at the Cambridge meeting of the British Medical Association, many of the members signed the following address to the Home Secretary:—

'We, the undersigned members of the British Medical Association assembled at Cambridge, disapprove the present custom of burying the dead, and desire to substitute some mode which shall rapidly resolve the body into its component elements by a process which cannot offend the living, and may render the remains absolutely innocuous. Until some better mode is devised, we desire to promote that usually known as cremation. As this process can now be carried out without anything approaching to nuisance, and as it is not illegal, we trust the Government will not oppose the practice when convinced that proper regulations are observed, and that ampler guarantees of death having occured from natural causes are obtained than are now required for burial.'

I have been informed that many more members would have signed the address if they had heard of it or seen it; and it is probable that others, not members of the Association, might wish to sign it before it is presented. I shall therefore be obliged if you will allow me to make known through your columns that I shall be glad to receive, by note or post-card, the name of any gentleman who may desire to append his signature to the memorial.

27th August, 1880. W. EASSIE, C.E.

11, Argyll Street, W.

Dr. Spencer Cobbold's paper on 'Trichinosis and the Dangers arising from the Consumption of Flesh Food', published in the SANITARY RECORD for May 15th and June 15th, 1880, has been translated into Italian and republished in the *Osservatore, Gazetta delle Cliniche di Torino.*

SANITARY INVENTIONS.

COOKE'S NON-ARSENICAL WALL-PAPERS.

WE are glad to see that the practice of colouring wall-papers with non-arsenical colours is extending amongst manufacturers, to their own pecuniary benefit we hope, as well as to the health of the community at large. It is practically impossible that every one desiring a room to be papered should have the paper selected tested for arsenic, although in many instances such an outlay would be a good investment. The public are, as a matter of fact, utterly dependent upon the manufacturers for the innocuity of the papers supplied by them; and it is therefore with pleasure we see that Mr. William Cooke, of Grove Works, Leeds, has added his name to the honourable list of manufacturers who supply paper-hangings which are at once perfectly harmless, and yet in no way deficient in any beauty of colour which can be obtained by the use of arsenical dyes. Mr. Cooke uses every precaution to prevent the employment of poisonous pigments in his manufactures; all colours and other materials are, as in other instances to which we have referred in these columns, bought with a guarantee that they are free from arsenic in any of its various combinations, and, as a further safeguard, samples taken from the bulk after delivery are constantly sent to a certified public analyst for verification. Now that more than one firm of first-class paper-stainers have, by the aid of chemical science, made strenuous and successful efforts to supply the public with harmless and beautiful coverings for their walls, it is the fault of the individual if he do not avail himself of the guarantee against injurious influences thus placed at his disposal.

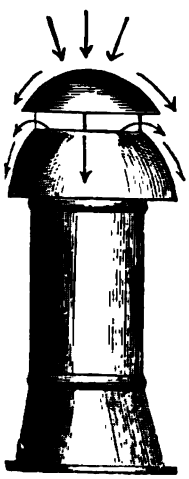
TURNER AND ROBERTSHAW'S PATENT DIVIDABLE CLOSET GUARD AND DEODORISER.

THIS method of collecting and dealing with excrementitious matter has been invented and patented by Mr. John Turner, late Chief Sanitary Inspector to the Corporation of Bury, and is designed to supply the long-felt want of a simple and effective arrangement (without any mechanical actions, which are liable to get out of order), whereby urine and similar substances in a liquid state are intercepted and separated, and the residue or solid matters do not become offensive while contained in the pail or receiver, and may be removed readily therefrom and utilised as a manure, without being passed through the usual processes of drying and burning. The chief items of merit claimed for this invention are: 1. The employment of an appliance, in the form of a guard and channel, to intercept the urine, and to prevent the same from coming into contact with the stools or solid matters, and which guard cannot get out of order. 2. The prevention of noxious emanations being formed by the excreta while in the pail or receiver, as the solid matters are free from liquids, whereby the generation of noxious smells is prevented. 3. A saving of about 600 per cent. in cost of carriage and removal, as the excreta, being free from liquid, a comparatively large amount can be carted away at one time. 4. A saving in cost, and in the wear and attention to the pails, as the same will keep clean for a much longer time, and will not require emptying and cleansing so often as in the old system. 5. A great saving in time and labour, as the contents of the pails can be emptied into a cart for removal, and

will not require removing so often as in the old system. 6. The greater utility of the excreta, as the manure being in a solid state, it can at once be used as a fertilising agent after removal from the pails or receivers. 7. The advantage of collecting the urine clear from the solid matters, which can be then employed by fullers and others without further separating and filtering. 8. The advantage of storing the solid matters in a heap under a shed (to exclude rain) without any noxious gases generating therein, from whence they may be removed and utilised as a manure at intervals of time. The invention is also applicable, and can be readily applied to all forms of closets, commodes, etc. By its use all solid and liquid matters are separately collected in the closet, and before removal. We strongly recommend this invention to the notice of Sanitary Authorities and Local Boards, as it supplies a very generally felt want in urban economy. All particulars as to prices, etc., of this invention, may be had of Messrs. Turner and Robertshaw, or from their Agents, The Sanitary and Domestic Appliances Co., 10, Exchange Arcade, Deansgate, Manchester.

SHARPE'S CROWN EJECTOR.

This is the name given by the inventor to perhaps the most effective of that class of ventilators, in which, by the action of an induced current, the room below, to the roof of which the ventilator is attached, is cleared of its vitiated atmosphere. It is also of the non-revolving order, and requires, therefore, no attention whatever after once being placed in position. The wind plays upon the dome of the ventilator and its cap, and in this way a partial vacuum is created, which is continuously replaced by foul air rushing up from below to seek for diffusion in the exterior air. The Crown Ejector has yet another merit, and that consists in its being all in one piece; but, apart from its efficiency, its advent will be hailed with satisfaction by all who seek for that desideratum combined with a neat and presentable appearance, and thus contrasting favorably, from an art point of view, with many of the unsightly eject ventilators which are but too painfully visible along the horizon of roofs in town and city.



We have so far described the Crown Ejector merely as a means of effecting the withdrawal of respired air from dwelling-rooms, schools, halls, theatres, hospitals, and the like, and as valuable in the upcasting of hot air, steam, and offensive gases, in breweries, kilns, and work-sheds, as well as being admirably adapted for soil-pipe finials. This, however, is not the only function upon which it can be relied to perform, for it is simply admirable as a smoke preventer when fixed to the head of the flue where the brickwork of the chimney terminates, or a foot or so above. There are no interstices or corners in this Ejector in which the soot can accumulate, and it can be fixed at any inclination, and what is of most consequence, occasionally below other roofs, without impairing its full action.

PEARSON'S PATENT TRAPLESS 'TWIN-BASIN WATER-CLOSET'.

THIS is a favourite closet with many people, and is largely in use. It belongs to the order of wash-out closets, is made all in one piece of earthenware, and is absolutely without any complication in its action. Its peculiarity consists in the division of the receiver of the apparatus into a twin-basin, one containing the flushing water, and the other holding the luting water and voidances. The water is supplied to both basins at the same level, and shuts off when the dipping piece between the compartments is sufficiently hidden to secure an hydraulic seal. The supply into the flushing cistern part of the apparatus is by means of an ordinary ball valve, and there are therefore no wires or cranks needful. The fæcal matter passage is by way of a perpendicular, or other descent pipe, fitted with a simple india-rubber covered plug, which, when lifted, empties both basins, and effectually closes and keeps the water in the basins when dropped down. To this excellent closet the makers have now added the patent joint for connecting the closet with the soil-pipe invented by Mr. Brian Jones. This device is worthy of great praise, as it is imperishable, avoids a putty joint and its consequent ruptures and displacements, and effectually seals a very awkward place for jointing against any inroad of drain air. Neither is there any necessity for a trap of any kind under the floor line, of itself a great boon in closet fixing. Furthermore, any ordinary intelligent plumber can fix it in an absolutely secure manner, as all he has to guard against is a leaning position of the cup which receives the plunger that retains the water in the basins. This closet will prove a great desideratum where there is a sufficiency of water and no chance of a stoppage in the supply due to frost.

MANDER'S NON-POISONOUS COLOURS.

To those who prefer distempered to papered walls, Messrs. Mander Brothers of Wolverhampton offer a large choice of non-poisonous colours. We have before us one of their pattern-books containing no less than eighty-one shades and varieties of colour. The fashionable Venetian and Persian reds, Chinese yellows, and æsthetic greens, will here be found in every shade. Their beauty is incontestable, and Messrs. Mander claim for them the useful qualities of being non-poisonous, time-resisting, and fast in light, together with the desideratum of the age—moderate price. Their permanent white distemper is guaranteed by the firm to be perfectly non-poisonous, as white as zinc oxide, and to possess about double the body of lead, without any of the dangers and defects of lead. Much has been written about the dangerous effects of lead paints and powders, but recent pages of the *British Medical Journal* and of the *Practitioner* show that the evil continues, and that cases of illness and death from the use of this deadly ingredient are constantly occurring. So late as in the *Practitioner* for the present month, details of two cases of lead poisoning are reported by Dr. Henry Barnes of Carlisle. We do not go so far as to credit manufacturers of non-poisonous paints and papers with purely philanthropic motives; but we recognise that they confer a distinct benefit both on the public and the artizan whose business it is to handle them; and for this reason we wish to make as widely known as possible the names of those firms where materials can be procured with which

houses can be decorated without danger to health and life, and which are not so numerous as might reasonably be expected.

PREPARED BORAX AND BORACIC PREPARATIONS.

We have received from the Patent Borax Company, Birmingham, samples of various products manufactured by them, in which the ascertained power of borax to arrest the growth of vegetable cells and the putrefaction of animal substances, as well as its remarkable cleansing powers, have been skilfully utilised. These qualities are exemplified in the Company's prepared Californian Borax, an efficient antiseptic; in a variety of soaps for the toilet, washing, house-cleaning, and stable purposes; in the Borax Ham and Bacon Preserver, in which one of the most conspicuous advantages of boracic preparations is brought to bear; and in various starches and glazes for linen. Many of these have undergone the test of careful trial in our own household, and have fulfilled the purpose of thorough and rapid purification of linen and domestic appliances in general use. The toilet soap is very pleasant to use, and rapidly removes all inkstains and other accidental defilements of the purity of the cuticle. The London depôt for these products is at 9, Mincing Lane, E.C.

McDOUGALL'S PATENT FLOUR.

It is distinctly proved by microscopic examination that the ordinary processes of preparing flour from the wheat grain, abstract bodies of a very high nutritive power, notably in the case of the nourishing salts, to the amount of three-fourths of the whole quantity of phosphates contained in the wheat. Now, of all the salts taking part in vital processes, these phosphates are the most important, and their abstraction from the most nutritive constituent of our diet deprives us of a most important element of nutrition. Nor, under the present system of preparing the flour and making the bread, is this all the mischief worked by mistaken processes; after the miller has done his part to impoverish the staff of life by removing the major portion of the phosphates and some of the gluten, the baker steps in, and, in carrying out the process of fermentation by the use of yeast, in the dough, he destroys a further proportion of the gluten. To counteract the effect of these unscientific processes, many medical men and others have advocated the use of whole meal bread; but this form of bread does not agree with all persons, the particles of bran producing an irritating effect on the digestive tract. Professor Horsford, of Cambridge University, U.S.A., has solved the problem of securing the largest amount of nutritive quality and the most perfect digestibility of the bread by mixing with flour, prepared in the ordinary way, a dry, highly acid phosphate of lime and dry bicarbonate of soda in such proportions as to leave a neutral phosphate of lime and soda after the dough has been thoroughly kneaded and baked. The carbonic acid, having of course been expelled from the bicarbonate by the action of the phosphoric acid, the amount of the salt thus added exactly restores the flour to the natural standard, and replaces the phosphates of the alkalies and of the alkaline earths, lime, and magnesia. This flour possesses also considerable culinary advantages, being self-raising and requiring no artificial ferment, as baking powder or yeast. It makes very superior home-made bread, pastry, cakes, biscuits, etc. Owing to the absence of ferment, the bread made from it can with impunity be eaten hot, so that we may partake of those usually indigestible dainties, hot rolls for breakfast, without fear of subsequent indigestion. To economical housewives, the flour recommends itself by requiring a smaller quantity of butter, lard, and eggs to produce satisfactory results than the ordinary flours of commerce. Once tried, the wholesomeness, the superior facility it offers in manipulation, increased amount of nutritive quality and economy of Mr. McDougall's flour, will ensure its favour in the kitchen department as well as in the dining room. It is to be obtained in various sized packages, for family use, at 10, Mark Lane, E.C., and Poland Street, Manchester. We strongly recommend a trial of this excellent flour, being convinced of the dietetic and economic advantages it offers to the public.

NOTICES OF MEETINGS.

SANITARY INSTITUTE OF GREAT BRITAIN.

The Autumn Congress of this Institute will be held at Exeter, from September 21st to the 25th, 1880. The Exhibition of Sanitary Apparatus and Appliances will be held in the New Abattoirs, from September 21st to October 9th. The President of the Congress is the Right Honourable Lord Fortescue. The Honorary Local Secretaries are Edward J. Domville, M.R.C.S.E., St. David's Hill, and H. Percy Boulnois, M.Inst.C.E., Mount Radford, Exeter. The offices at Exeter are at Victoria Hall.

CAMBRIDGE EXAMINATION IN SANITARY SCIENCE.

The next Examination in Sanitary Science, by the University of Cambridge, will be given on October 5th. Candidates (whose names must be on the Medical Register of the United Kingdom) should send in their names to Professor Liveing, Cambridge, before September 25th.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

At the annual meeting held on the 13th July, the following officers were elected for the year ensuing: President—Dr. J. S. Bristowe. Vice-Presidents—Dr. G. Buchanan, Dr. Thomas Stevenson, Dr. C. O. Baylis, Dr. W. H. Corfield. Treasurer—Dr. J. W. Tripe. Secretaries—Dr. J. N. Vinen, Mr. S. F. Murphy. Council—Dr. G. P. Bate, Dr. A. T. Brett, Mr. F. M. Corner, Dr. J. Dixon, Dr. T. O. Dudfield, Dr. A. Hill, Mr. E. L. Jacob, Mr. S. R. Lovett, Dr. E. C. Seaton, Dr. J. Stevenson, Dr. R. P. B. Taaffe, Dr. J. F. W. Tatham.

INTERNATIONAL SANITARY CONFERENCE.

Mr. Evarts, Secretary of State for America, has sent a circular through the American Ministers abroad, inviting the Maritime Powers of the world to send representatives to an International Sanitary Conference to be opened at Washington on January 1st, 1881, with a view to securing a system of notification of the actual sanitary condition of the ports under the jurisdiction of the respective powers, and of vessels sailing from those ports. In the event of the date of the proposed Conference being unacceptable to any of the Powers invited, a day would be fixed to suit their convenience.

THE CONGRESS
OF THE
SANITARY INSTITUTE
OF GREAT BRITAIN,
HELD AT
EXETER, SEPTEMBER 1880.

THE fourth Annual Congress of the Sanitary Institute of Great Britain was opened at Exeter on Tuesday, September 21st. The Mayor and Reception Committee entertained the principal members attending the Congress at a public luncheon. The Right Worshipful the Mayor (W. H. Ellis, Esq.) presided; amongst those present being Earl Fortescue (President for the year); Mr. H. Stafford Northcote, C.B., M.P.; the Sheriff (S. Jones, Esq.); Dr. Richardson; Mr. R. Rawlinson, C.B.; Mr. E. Chadwick, C.B.; the Rev. Edgell Wyatt-Edgell; Major Wyatt-Edgell; Sir Antonio Brady, F.M.S., F.G.S.; Dr. Bartlett; Mr. Symonds (President of the Meteorological Society); Dr. Alfred Carpenter; Professor F. de Chaumont; Mr. Henry C. Burdett; Major-General Bartlett; Professor W. H. Corfield; Mr. Rogers Field, M.I.C.E.; the Mayor of Okehampton (Dr. Waters); Dr. Pullin (Sidmouth); Dr. Henderson; Messrs. J. Woodman and H. P. Boulnois (Local Hon. Secretary).

At the first General Meeting the opening address was delivered by the new President of the Congress, Earl Fortescue. The chair was occupied by Dr. B. W. Richardson, F.R.S., LL.B., who called upon Earl Fortescue to take the presidential chair.

EARL FORTESCUE'S ADDRESS.

DRAINAGE AND SEWERAGE OF TOWNS.

EARL FORTESCUE, in the course of his address, after reviewing the course of sanitary legislation since 1848, said: The Metropolitan Board of Works proceeded to construct, as soon as their engineer, Mr. Bazalgette, had completed the designs for them, the gigantic intercepting sewers for rainfall as well as sewage, with pumping engines and outfalls near Barking; enormously costly, and as unsatisfactory as costly in their construction and working. The frequent occurrence of disastrous floods in London south of the Thames since their completion, and the fouling of that noble river for miles below London, in compensation, I suppose, for some purification above effected by these colossal works, would alone be conclusive as to the erroneous principle on which they were planned. My late gifted friend, Mr. F. O. Ward, an active but too little heeded member of the last Commission of Sewers, when protesting against the idea of intercepting along with the sewage proper all the rainfall descending on the surface of the metropolis, and at great cost pumping much of it into the Thames below London, tersely set forth the right principle in words which deserve to become proverbial: 'The rainfall to the river, the sewage to the soil.'

The governing body at Paris has recognised this truth, and in accordance with a most able and exhaustive report from M. Millet, their chief engineer, has been for some little time acting on it in the plains of Genevilliers, so as not only, as I have seen on the spot, to purify the great volume of sewer water already conducted thither as the precursor of much more, but also at the same time to fertilise with it a large tract of market garden, which filters it on its way to its final discharge, clear and bright, into the Seine. I am told that Berlin also will before long surpass London in its sanitary arrangements, in water-supply at constant pressure, in its hydrants, in its house drainage and street sewerage, and in the profitable use, instead of the noxious deposit, of the sewage.

The undiminished—indeed, for more than a decade, the slightly increased—mortality of the metropolis, after the great sums expended upon house-drains and sewers in it since 1854, affords melancholy proof, apart from the testimony of our noses, that many of these new house-drains and sewers have not been constructed upon the self-cleansing principle successfully adopted years ago, at very moderate cost, in many provincial towns, with large reductions, when their water-supply was good also, in their previous mortality and sickness. The mortality in Dover, for instance, was brought down to 14 per 1,000; in Croydon and Bedford it has been brought down to two-thirds of their previous rate; in all with corresponding reduction in the amount of sickness. Mr. Rawlinson, C.B., of the Local Government Board, has planned and superintended the execution of some of these successful provincial works of sewage, house drainage, and water-supply.

All experience has confirmed the truth of the principle laid down as long ago as 1842 by Mr. Chadwick, that the best planned sewers and house-drains of the most approved form and best materials, without an adequate and constant supply of water, would become in dry weather merely elongated retorts for the generation and diffusion of noxious gases; that, on the other hand, a large water-supply without good drains and sewers would render the site of most towns unwholesomely damp, and of some quite marshy; that, in the case of the poorer dwellings, intermittent water-supply, from however pure a source, means contaminated supply, owing to its stagnation in foul cisterns and decaying waterbuts, rendering it hopelessly unpalatable to drink; that, therefore, both good sewers and good water-supply are alike requisite; that each is indispensable to the other's satisfactory action; and that no town could be considered in a proper sanitary state while either was grossly defective.

Speaking of the consolidation of statutes, and the unification of authority by the Public Health Act of 1875, the noble Earl went on to say: We find that while, according to obvious analogy and in conformity with the recommendations of the Royal Sanitary Commission, all the control of dairies ought to have been vested in the Local Government Board, by the Contagious Diseases (Animals) Act of 1878, it was given to the Privy Council. The assignment of any veterinary jurisdiction to the Privy Council is contrary to sound principle.

The Metropolitan Board has made some 150 miles of main sewers, reported to be mostly sewers of deposit, only relieved by costly flushing, which a self-cleansing system would have rendered unnecessary. And after nearly a quarter of a century's experience of that Board we do not find the mortality diminished at all as it ought to be; we do not find the streets as much sweeter as they ought to be; we do not find their surface either as smooth or as clean as it ought to be, and as it is at Paris; we do not find the house-drainage as much improved as it ought to be. Not only do we hear of many private houses of the rich and very many more of the poor, but latterly of several public offices, as being much tainted with

sewer gas. Not only the long notoriously pestiferous War Office, but even the stately new offices are in disgracefully bad sanitary condition. At the Institute of Civil Engineers the chief engineer of the Board of Health recently stated that no new public building in Great Britain could be in worse condition than was the office of his department; that according to a report in his possession the sewers of Whitehall, Downing Street, Great George Street, and Victoria Street, were flat-bottomed, never flushed, had a deposit of more than fifteen inches in them, and yet were unventilated. An excess of some seventeen thousand preventable deaths annually, about a hundred fires allowed to become serious and some twenty persons burnt alive for want of a system of hydrants under constant pressure, are the penalties of this mismanagement.

With regard to provincial towns, all the best results have been obtained only where the works both of sewerage and of water-supply were complete, and this is far from being general. We find Manchester, for instance, with its admirable system of water-supply on a public footing, has a high mortality, because its house-supply is extensively deficient, and that it is in great measure a city of 'middens' and cesspits. The tub, happily abolished there as a receptacle for clean water, yet as a receptacle for stagnant filth, frequently, but not frequently enough, carted away, takes the place far too often, both unwholesomely and expensively, of the self-cleansing house-drain through which the sewage begins to flow off as soon as it enters.

Influence of Sanitation on Mortality.—In 1875 I moved for a Return of the sums spent on drainage and water-supply in certain towns in Lancashire, and of the deaths from all causes, and specially from zymotic diseases, in the same years, and also of the duration of life of different classes in them, and in the county of Rutland. With regard to Manchester only, in the ten years from 1864-1873:—

	On drainage and sewerage.	On water supply.
Manchester spent -	£105,789	£863,544
Rutland county spent -	£1,864	certainly nothing.

The return in Rutland is incomplete as to drainage, though the amount is stated to be very small, and there died:—

	Manchester.	Rutland.
From all causes - - - - -	82,424	20,329
Of zymotic diseases - - - -	4,406	675

The average age at death in the thirteen years from 1861-1873:—

	Manchester.	Rutland.
Of the gentry and professional persons and their families - - - -	44.6	48.1
Of tradesmen, etc., and their families -	28.9	44.4
Of labourers, mechanics, and servants, and their families - - - -	24.4	36.0

To take another town. Those who know Birmingham and its fine site, declare that there can be no other reason why, instead of 24 in 1,000 according to the last returns, its deaths should not be 16 in 1,000, or even as low as they were several years at Dover, 14 in 1,000, except the inhabitants' ignorance of the duties of self-government; no reason why they should have an excess of 2,600 deaths above a healthy standard, except by their neglect to profit by the sanitary lesson afforded, according to the statement of the Medical Officer of Health, by two institutions close to Birmingham. One of these is for destitute children, where the death-rate was only 3 per 1,000; less than a quarter, probably, of that to be found among the ill-cared-for population of that city, for whom the application of the same principles with the same results would save 1,600 children a year. The other excellent example is the prison, where the officer in charge stated that the death-rate among those who came in without already developed disease was not more than 2 in 1,000. A similar rate in the unfortunate city would imply the saving of more than 2,000 deaths annually.

The mortality of children under five affording the best and most delicate test of the healthiness of a place, Earl Fortescue read a few figures about London, Manchester, and Birmingham. They were as follows:—

	London.	Manchester.	Birmingham.
Estimated population in the middle of the year 1877 -	3,533,484	359,273	377,436
Density, persons to an acre, 1877 - - - - -	46.9	83.7	44.9

Deaths at all ages:—

	London.	Manchester.	Birmingham.
Mortality per 1,000 living -	21.9	27.4	24.2
Number registered - - -	77,449	9,810	9,104
Number if mortality had not exceeded 17 in 1,000 living -	60,069	6,107	6,416
Number above the healthy standard of 17 in 1,000 living -	17,380	3,703	2,688

Deaths of children under five years of age: -

	London.	Manchester.	Birmingham.
Deaths registered:			
Number - - - - -	31,891	4,085	4,461
Proportion per 1,000 living	69.7	83.1	84.1
Proportion to 1,000 deaths at all ages - - -	41	41	49
Number if general mortality were 17 in 1,000 living, and the proportion to total deaths were 25 per cent. - -	15,017	1,527	1,604
Excess of deaths registered over number in preceding line -	16,972	2,498	2,857

The second day of the Congress of the Sanitary Institute was devoted to a gathering of the Section entitled 'Sanitary Science and Preventive Medicine'. The President of the Section was Professor F. S. B. F. DE CHAUMONT, M.D., F.R.S., who delivered an address, from which we take the following passages:—

PROF. DE CHAUMONT'S ADDRESS.

HISTORIC REVIEW OF CLEANLINESS.

Sanitary questions, in one form or another, are of very old date, and many of the earliest writings are occupied with rules and instructions as to how health is to be preserved and plagues to be avoided. Advantage was taken in many cases of the superstition of the people, when the more enlightened rulers sought to enforce those rules and practices by giving them the sacredness of religious observances; in fact, making their discharge a *religion* or outward sign of the faith they professed. In matters of practical sanitation the ancients were in many things in advance of the moderns. The hygiene of both cities and camps was understood to a remarkable degree, whilst the habits of personal cleanliness and the healthy out-door lives most men led no doubt greatly conduced to the well-being both of the individual and the community. Although we read of plagues and pestilences from time to time, it is not until we have passed the Christian era that we begin to encounter those appalling pestilences that so often struck terror into the heart of Europe, and made its wretched inhabitants think the end of the world was at hand. The fall of the Roman Empire was in a great measure the era of retrogression in a sanitary sense, although it may have had its advantages in

other ways. It may shock the feelings of some, but it must be admitted that the progress of Christianity had an evil influence on the sanitation of the world. It so happened that both pagan and Jew were clean, and the Christian could think of no better way of testifying his opposition to both than by doing the reverse of what they did. Therefore, the more fanatical ceased to wash either person, clothes, or dwelling, because pagan and Jew cleansed all three. Dirt became the odour of sanctity, as the hideous tales of St. Simeon Stylites and other unsavoury fanatics only too truly tell. The baleful influence of those misguided views continued to be felt through succeeding generations down to our own day, and it may be a question whether we do not owe some forms of malady at the present time to the effects of the accumulated filth of ages. Dr. Richardson has called attention to the remarkable immunity enjoyed by the Jews, who have continued to practise those purifying observances handed down to them in the law of Moses.

Sanitary science can only advance as medical science proper advances, and by medical science we mean especially diagnosis, pathology, and etiology; that is, the correct recognition of disease; its history and description, as revealed by researches both in life and after death; and lastly, its causes, proximate or remote. In the two first branches the forward progress has been in modern times extremely rapid, and in many directions highly satisfactory. Of the last, the determination of the causes of disease, I am afraid I cannot speak with so much confidence, although we have made some advance. But it is upon this very branch of the subject that the advance of sanitation towards the dignity of an exact science depends. Until we know more of the causation of disease, it is impossible to lay down rules for its prevention. But because progress is slow, are we to despair? Certainly not. But the only way to effect progress is by careful observation and recording of facts, having full faith that the day will assuredly come when those facts will range themselves in proper order and reveal the hitherto unknown law that binds them together. But each fact must be the truth, so far as we can make it so, and its bearing must be measured and its value weighed. The word 'medicine', from the Latin 'mederi', is traceable to an Aryan root 'mêdh', or 'mêd', which means 'to know', 'to understand'; that is, not merely to be a store-house or lumber-room of isolated facts, but to be, if possible, a properly classified museum, in which each is arranged according to its correct natural affinities. Curiously enough, etymology carries us still farther back into the morning of our race, and shows us that the root 'mêdh' was connected in a far earlier time with the root 'madh', to measure—a root which we find in *mathematics*, *moderation*, and in *measure* itself. It would seem that these two roots became early separated, just as medicine and the science of measurement, or mathematical precision, have been so long divorced. It is the province of our age to bring about a reunion of these two, which have been so long estranged. The more the science of measurement, in its widest sense, has been applied to biological inquiries, the more it has been seen that all nature is obedient to fixed laws, and we need have no fear that that part of biology which has to do with the causation of disease is in any way an exception. The Greek myth which made the Goddess of Health the daughter of Esculapias, the typical physician of the heroic age, contained a germ of truth which could be appreciated only in later times. Another story makes hygiene or health an attribute of Minerva, indicating that upon wisdom or knowledge all health depends. Let us hope that in this case wisdom may be justified of her children.

Mr. H. C. BURDETT read the following paper on

THE UNHEALTHINESS OF PUBLIC INSTITUTIONS.

In a paper read at the Sanitary Congress at Croydon last year, I drew attention to the sanitary defects which had been found to exist in some of the older public institutions in this country. Special reference was made to the Manchester Royal Infirmary, which had been reported by Mr. Netten Radcliffe, of the Local Government Board, to be unhealthy from cellar to garret. The defective health arrangements at the large lunatic asylums were referred to, and the condition of the County Asylum at Frome, where thirty-two cases of spontaneous erysipelas occurred amongst the inmates between December 1878 and May 1879, was selected as a typical example of the insanitary condition of the majority of such buildings. At neither Manchester nor Frome could reliable information as to the drainage arrangements of the buildings be obtained, and no proper plans could be found. It was further stated that investigation had brought to light the startling fact, that not ten, and possibly not five per cent. of all the hospitals throughout Great Britain and Ireland possess any reliable plan of their drainage arrangements. Even some of the most important hospitals in the kingdom had no such plans, and it would be easy to give instance after instance of the culpable ignorance which prevailed on this important subject. Remembering the foregoing facts, I further ventured to ask, what is the probable condition of the drains of all institutions built some fifty years ago?

Last year I specially referred to old institutions as opposed to recent buildings. By a sublime act of faith I took it for granted, that buildings erected within the last ten years would certainly not suffer either from insanitary construction or defective drainage. From the amount of attention which questions of hygiene have excited, and the numerous and competent authorities who have written and spoken on the subject in all its branches, it might at first sight have been taken for granted, that architects of more or less eminence would have brought much intelligent study to the consideration of the right construction of drains, and to that of sanitary arrangements generally. Unfortunately experience proves the reverse to be the case, and, if anything, the newer the building the worse probably is its sanitary condition. Is it not time that the Royal Institute of British Architects took up this question of sanitary construction, and that its Council should make regulations for the guidance, instruction, and training of the rising generation of architects? Such a course will ultimately guarantee the public against the defective, unhealthy, and discreditable condition of many public and private buildings which have been erected under the supervision and from the plans of some of the most eminent men in the profession. It is quite certain that the Institute of British Architects must declare, either that the profession repudiate all responsibility for insanitary defects in dwelling houses and large public institutions, because hygienic arrangements are no part of an architect's business, or they must promptly offer adequate guarantees to the public which will protect it from the disastrous results which now, alas, too frequently follow the occupation of a newly-erected

edifice. Suppose a wealthy client pays a large sum for the erection of a new house, which he has been assured by his architect is planned and arranged upon the most perfect system known to modern science. The architect cannot expect that such a client, however much he may be reconciled to the anxieties and increasing expense of each addition to his family, will, without remonstrance, submit to an annual and increasing outlay for sanitary alterations and drainage improvements, rendered necessary by the carelessness or ignorance of the architect himself. It may be thought that new buildings are as a rule carefully erected, and that there is no justification for the foregoing remarks. Unfortunately for architect and client, such is not the case.

Since the meeting at Croydon the following cases have come under my notice, and I hold myself responsible for the accuracy of the following descriptions of three new buildings, *a hospital, a convalescent institution, and a lunatic asylum*, which have all been built, opened, and occupied within the last seven years. All names are purposely withheld.

The Hospital had not been in occupation for more than eighteen months, when the atmosphere of the building and the health of the inmates pointed to defective drainage and construction. An examination of all the drains, baths, and other conveniences, proved the sanitary condition of the building to be most unsatisfactory. It soon became evident that very considerable alterations were needed to remedy the defects. This new hospital had therefore to be closed within three years of the date on which it was opened. A thorough investigation brought to light the following facts: The cisterns were placed so high that the pressure from the main was seldom or never sufficient to fill them. In consequence there was a gradual choking of the drains throughout the hospital, and an admission of sewer gas to all parts of the building. No man-holes or means of inspection were provided, and the plans of the drains were found to be unreliable. With four exceptions the drains were laid outside the building, but the levels were very irregular. Thus: the level at the lower end of a drain was 1 in 60, higher up it was 1 in 24, and above this, again, 1 in 125. No wonder the drains were found to be choked. The pipes were also badly laid. In some places they were leaky, and very foul excrementitious matter was discovered in the soil near them. All pipes were pointed with clay, not embedded in cement, and few were water-tight. In fact, the defects were serious enough to guarantee the admission of sewer gas to all parts of the building. The hospital drains were in direct communication with the town sewer. The rain-water pipes opened directly into the drains, they were untrapped, and as they were only carried to a level with the upper part of the windows of the top wards, they conducted volumes of gas from the sewer to the wards. The soil-pipes were all inside the building, and were trapped at the foot, and ventilated by smaller pipes carried up a certain height and then bent over. These traps were quite inaccessible, and the soil-pipes were not properly ventilated, as they were only open at the top, so that no current of air could pass through them. As there was no inlet at the ground level, foul air was forced out through the lower closets into the hospital, whenever any considerable volume of water passed into the soil-pipe from the upper floors. The slop-sinks discharged into the soil-pipes, and were practically untrapped, so that by their means sewer gas was laid on to every ward in the hospital. There were other defects, but I have given enough details, and no one will be surprised that the sufferings of the surgical patients and the general unhealthiness soon compelled the committee to close the hospital.

The Convalescent Institution stands in its own grounds of eight acres. It is beautifully situated. It has extensive gardens and every convenience, not to say luxury, that modern taste could suggest. The cost of the site, buildings, etc., was upwards of £50,000; there is accomodation for some 200 patients, and it has been occupied for less than five years. Within a year of its being opened there was a sharp outbreak of erysipelas amongst the patients, and the institution was closed and fumigated. It was noticed at the time that all the conveniences opened into the building directly opposite the wards, and a suspicion of defective drainage arose, but was not credited, owing to the fact that the building had been occupied for barely one year. A few months ago the unhealthiness of the institution was so marked, that the committee gave instructions for a complete examination of the drainage system. No plan of the drainage could be found, but one was ultimately furnished by the architect which proved to be incorrect in many particulars. All drain-pipes, etc., were found to be in and beneath the building. The baths, lavatories, and sinks opened directly into the sewer, and many were untrapped. In that portion of the building allotted to the officers, owing to an ingenious arrangement of the lavatories and the pipes connected with them, sewer gas was admitted at both ends of each floor. The ventilation of the drains and sewers was so defective, that during certain winds the sewer gas was driven through and into the building by means of the ventilators. Some of the drains were laid up-hill, all were pointed with clay and not embedded in cement, all leaked, and the main sewer, as it passed from the building, was laid at irregular levels, and in more than one place, owing to imperfect workmanship and improperly made ground, the pipes of which it was composed were not in contact with one another. The main sewer had to be entirely relaid. All the drains were taken up, and with the soil-pipes were placed outside the building. It is not to be wondered at, in the face of the foregoing facts, that instead of being a convalescent institution, these defects of construction compelled the convalescents to return, not to their own homes, but to the hospitals from which they came; whilst the majority of the resident staff were placed on the sick list. Yet the architect had in this case unlimited funds at his disposal, and the fullest liberty to do all that he thought necessary or desirable.

The County Lunatic Asylum has been opened for the reception of patients for five years. Built regardless of expense, it was supposed to contain all the most recent improvements in lunatic hospital construction. Almost from the date of its occupation it has been the scene of outbreaks of dysentery and erysipelas. During the first eight months of 1879, cases of these diseases were of constant occurrence on both sides of the asylum. There were twelve fresh cases of dysentery and four of erysipelas every month.* Suspicion having fallen on the state of the drains, ultimately a competent engineer was appointed to examine them. Numerous faulty points in the system were detected, and their rectification has been followed by the disappearance of dysentery and erysipelas from the establishment.

I have here given positive proof from the experience of the past twelve months alone, that the architects who have been entrusted with the erection of these

* *British Medical Journal*, September 4th, 1880; page 401.

large public buildings devoted to medical purposes, have shown an ignorance, or, if you prefer it, a total disregard, of the elementary principles of sanitary science. I content myself with stating these facts, and refrain from comment, but I appeal to the Royal Institute of British Architects to apply a remedy which will prevent like abuses for the future. If they fail to do this, then let them boldly hand over all matters affecting drainage and sanitary construction to the engineer. By this means they can readily avoid a heavy responsibility, and save their profession from much discredit. I must, however, leave the decision to the professions more immediately concerned, and I hope the discussion which may follow this paper will lead to a satisfactory settlement.

It behoves the public to take the question up from a different point of view entirely. Private houses and public institutions are not free, as they ought to be free, from preventable impurities, and they are too often highly dangerous abodes for anyone who has a tendency to zymotic disease. No permanent prevention is likely to be secured without a thorough, an independent, aud a periodical inspection of all the structural and drainage arrangements of these buildings. A central office for the safe custody and registration of the drainage and other plans of all public buildings, hospitals, and private houses is a much needed reform. Competent inspectors and a central repository might be secured for a reasonable outlay, which would be over and over again repaid to those who were sensible enough to avail themselves of its facilities. At the present time no one seems to think of drainage arrangements. Nearly everyone is contented with a taking exterior. Yet the magnificent elevation of the block of new buildings known as the new Foreign Office did not protect its inmates from the inconvenience attending the presence of several inches of liquid sewage, which was found in the basement of the Home Office within a few weeks of its occupation.

In the discussion which ensued, Mr. ERNEST TURNER argued that the engineer should be required to construct sewers, and the architect should know thoroughly how to drain a building, or neither of them would be worthy of his name. The Royal Institute of British Architects had sought to induce the legislature to make it compulsory that all persons seeking to become architects should first pass an examination. They had not succeeded in that, but the Institute had resolved that no member should be admitted to its body without having satisfactorily undergone some sort of test, a knowledge of sanitary engineering and sewerage arrangements being indispensable. He was afraid that at the present time there were large numbers of incompetent men having the sanitary supervision of large districts. It was but little use for boards of health and similar bodies to have sanitary officers if they did not trouble themselves to ascertain that their duties were properly and efficiently carried out. In many instances of which he was aware, plans were submitted, but the drains, etc., were never inspected after being laid, and the consequences were often disastrous.—Mr. WM. WHITE thought it was rather unfair to the architect to saddle him, as was generally the case when anything wrong was discovered, with all the responsibility and blame.—Dr. CARPENTER looked upon the paper as resolving itself into the two matters of principles and details, and he considered the former should very rightly take precedence of the latter. One of the greatest causes of mischief was that people were employed by Boards of Health in country districts who were totally ignorant of even the rudiments of hygiene, and very often thousands, and even hundreds of thousands of pounds spent in so-called sanitary improvements might just as well have been thrown into the sea. Nineteen-twentieths of the nuisance-inspectors of the country districts knew nothing whatever about the first principles of sanitary science, and the same remark might be applied to engineers. In regard to sewer gas, which was looked upon as a fruitful source of disease, there was no reason whatever for its existence, and an engineer who could not construct a drain that would not harbour it was scarcely worthy of the name. He believed the Sanitary Institute would obtain what they were aiming at, viz., a class of men who, being educated up to it, would thoroughly understand those principles of sanitary science about which so much had been said.—Mr. E. J. DOMVILLE said that in the prevention of disease a great deal rested with those who had the carrying out of the details of a building, and it was very often found that defects were owing, not to the architect or the engineer, but to the plumber and the mason's labourer, who had scamped their work for the sake of saving half an inch of pipe or such like.—The discussion was continued by Mr. W. J. SQUARE, of Plymouth. Speaking generally with reference to private houses, he was of opinion that a great deal of good would be effected if the sanitary authorities of towns had the power to enter upon private houses, and inspect the sanitary arrangements.—Mr. TOWLE, of Oxford, and Mr. ROBINS, of London, having spoken; Earl FORTESCUE said that one of the most melancholy results of local self-government was the prevalence of jobbery. In one case that he was aware of, a man had been appointed to an important position, not because of his own talents, but by reason of his being a relative of a person whose talents had brought him a reputation.

Mr. WOODMAN read the following Paper on

THE EXETER SANATORIUM, WITH REMARKS ON THE IMPORTANCE OF EARLY ISOLATION OF CASES OF ZYMOTIC DISEASE.

Exeter was one of the earliest towns to provide a hospital for the reception of cases of infectious disease.

The Town Council of Exeter became the Urban Sanitary Authority by accepting the Local Government Act in 1867. But, previous to this, on the approach of the cholera epidemic of 1866, they appointed an Inspector of Nuisances and formed sub-committees, who made a house-to-house visitation; and in conjunction with the district medical officers, considerable sanitary improvements were carried out—house drains were examined and repaired; privies changed into water-closets; cesspools closed; new water-closets compelled to be erected, where required, with proper connection with the town sewers; water-cisterns were cleansed and numerous new cisterns covered, at a considerable cost to owners of small houses.

The guardians of the poor engaged extra medical men to act as assistants during this epidemic, which, although severely felt in Exeter, would undoubtedly have been far more fatal had these steps not been taken. At this time, the first attempt at providing a separate place for the reception of cases of infectious disease was made by the removal of a few cases, occurring in common lodging-houses, to the workhouse, where a couple of rooms, isolated from the house, were used for this purpose. In 1871, an attack of small-pox threatening the city, the Town Council

determined to build a small-pox hospital, or, as they called it, a Sanatorium; and after some considerable difficulty, owing to the unwillingness of owners to sell land for this purpose, they secured a very eligible site.

Here they built (of necessity hastily) a wooden building, with four wards—two 24 feet square, and two 20 feet by 24 feet—with a nurse's room between, whilst a covered way joined it to a cottage, in which cooking, washing, etc., were done; the hospital being capable of accommodating twenty-eight to thirty patients, and heated by Gurney's stoves.

It was opened on November 2, 1871, and during that year and those of 1872 and 1873, seventy-nine small-pox patients were admitted, viz.:—

		Recovered.	Died.
Vaccinated	62	60	2
Not vaccinated	17	12	5
Totals	79	72	7

In 1873, 1874, and 1876 (there were no patients in 1875) a few cases of typhoid fever were admitted, viz.:—

		Recovered.	Died.
Typhoid fever	28	22	6

But up to 1877 the building had been considered as a small-pox hospital, to be used, perhaps, occasionally as a fever hospital for cases that could not be treated in their own houses, but not as an institution to which all cases that could not be properly isolated in their own homes should be taken, so as to stamp out, if possible, zymotic diseases at their commencement.

Unfortunately for the immediate success of this principle, scarlet fever had spread itself very considerably before it was adopted, as will be seen by the admissions in 1877, which were:—

		Recovered.	Deaths.
Scarlet fever	80	74	6
Typhoid fever	14	13	1
Totals	94	87	7

Early in January 1878, small-pox in a very severe form was brought to the city from London by some young women engaged in the Christmas pantomime; but by promptly removing the cases to the Sanatorium, and thoroughly disinfecting the rooms, burning or disinfecting clothes, bedding, etc., and revaccinating all persons who had come in contact with them, the disease was soon eradicated. The number admitted in January was—

		Recovered.	Deaths.
Vaccinated	7	7	—
Unvaccinated	5	2	3
Patients who caught the disease whilst in the Sanatorium (vaccinated)	5	5	—
Totals	17	14	3

At this time there were several cases of scarlet fever in the building: and although the small-pox patients were placed at the other end, and those convalescent revaccinated, five patients caught the small-pox. All had been vaccinated in infancy, and none had the complaint severely, or were at all marked by it.

The Town Council have now built an entirely new permanent brick and stone building, consisting of two large wards, each to contain eight beds, with baths (hot and cold), nurses' rooms, etc. This is quite detached from the old building, and will be used when required—*i.e.*, if cases of two separate diseases should occur. Earth-closets are used, and excreta, etc., are buried. The usual out-buildings are provided. Every case of small-pox, typhoid or scarlet fever occurring in the city, which from any circumstance cannot be properly and thoroughly isolated where it is, is, on the order of the district medical officer of health, at once removed to the Sanatorium.

There is a nurse who resides at the cottage annexed, and extra nurses are engaged as required; whilst the medical attendance is undertaken by Messrs. Bell, Brash, Harris, and Woodman, who take it in turns to attend monthly.

The Sanatorium has now been open just nine years, and during that time the number of admissions has been:—

			Recovered.	Deaths.
Small-pox { Vaccinated ..	74	72	2
Small-pox { Unvaccinated ..	22	14	8
	96	86	10
Scarlet fever	97	91	6
Typhoid fever	107	91	15
Measles	9	9	—
	309	277	31

This result may be considered highly satisfactory, 309 cases with only 31 deaths, or 10 per cent., being much below the average. The sanitary inspector (Mr. Lendon) is provided by the Town Council with a roomy carriage (formerly a cab), which has a board and cushion fitted across one half of it, so that children can be laid quite down, and adults nearly so, in transit. This is disinfected after being used, and it can be obtained by any one requiring it on application to the sanitary inspector. An ambulance carriage has been thought of; but, at present, there is this objection—in removing all cases it is important to do so quietly and without calling particular attention to the fact, whereas a distinctive carriage being seen in the street would excite remark and lead, if not to a panic, at least to an exaggerated report of the number of cases removed to the fever hospital. At first there was some difficulty in persuading people to let their relatives be removed, and as it was out of the city it was not until the Exeter Town Council got (in 1875) an amending clause inserted in the Act giving compulsory powers to send not only to a hospital within their jurisdiction, '*but within a reasonable distance*,' that the removal could be made legally compulsory. This, however, has seldom been required, as year by year the patients appear to value more and more the healthy situation, the fresh air, and the care with which they are treated. The advantages of compulsion, etc., were never better shown than in the case of a laundress who was ironing clothes in the room in which one child was running about in the skin-peeling stage of scarlet fever, whilst another was lying on two chairs covered with the rash, clothes drying hanging all around him. The mother denied that they had the scarlet fever, and refused to let the children be removed. The magistrates, however, ordered the immediate compulsory removal of the children and the thorough disinfection of all the clothes. Wide-spreading mischief might thus have been caused had the case not been discovered when it was, as in the ordinary course the clothes would have the same evening been distributed all over the city. In alluding to the effectual stamping out of small-pox in January 1878 (since which date no cases have occurred in Exeter), it is only fair to the public vaccinator (C. H. Roper, Esq.) and the vaccination officer (Mr. C. Ashford) to call attention to the efficient way in which the vaccination of infants is performed in this city; whilst it is chiefly owing to the trouble taken by the district medical officers of Exeter (Messrs. C. E. Bell, E. A. Brash, and L. D. Harris) that these cases of infectious disease are discovered *at their commencement* and removed to the Sanatorium. Mr. Woodman hopes that these few particulars may induce many other

towns and districts to follow the example of Exeter, and establish hospitals for infectious diseases. It cannot be too much impressed on the public that all zymotic diseases *are, or ought to be, preventable.* This is generally allowed with regard to scarlet or typhoid fevers, but it is not equally known that measles and whooping-cough are not *necessary* diseases *which every child must have*, or we should not find mothers and nurses taking children to catch measles, because '*this is such a good sort*'. With regard to elementary schools, Mr. Woodman is of opinion that they are more often a source of the spread of these diseases than is suspected; instead of the teacher making due inquiries as to the cause of absence from school from illness, and if found to be of an infectious character not allowing the brothers and sisters to attend the school for a time, too often, in order to keep up the average attendance, or to swell the number at the examination and so increase the grant, children are allowed to come daily from houses where some are suffering from these diseases, and thus they become spread far and wide through the town. It is but fair to state that in some schools a very different mode is adopted, and all that can be is done to prevent any infected children coming to the school.

Mr. Woodman points out that as with the present facilities of locomotion it is impossible to prevent the introduction of zymotic diseases, it is to isolation we must principally look to check and stamp them out when they *first* show themselves, and this, he believes, it is impossible to do without—First, a proper hospital or building being provided by the sanitary authorities; and secondly, a compulsory notification of each case of infectious disease. The onus of this should rest on the parent or householder, and *not on the medical attendant.*

The plan proposed by him is that each householder, etc., should be bound under a penalty to inform (within so many hours) the local sanitary authority of any case of infectious disease occurring in his house, and he would further oblige (also under a penalty) the medical attendant to as early as possible inform the friends of his patient that he was suffering under an infectious disease, giving name, etc.

In each district the name of the person to whom notice should be given, with a list of the diseases to be reported, should be freely posted, all communications to be strictly confidential, and, if desired, visits, at first at least, to be paid after dusk, or report to be accompanied by a certificate from the medical attendant stating that proper isolation and disinfection are being efficiently carried out.

Mr. BURDETT agreed that the onus of registration should rest upon the householder, and effectual registration should be compulsory.—Dr. BOND, Gloucester, believed that the prejudice which prevailed against infectious hospitals would die away when it became more widely known how kindly and considerately patients were treated in those institutions. It was undoubtedly to their own advantage that they should be isolated, and have constant and efficient attention at hand.—Mr. E. J. DOMVILLE, Exeter, looked upon it as essential to the success of any sanitary scheme that the entire and undivided services of a medical man should be secured. In the event of a single Town Council or Local Board not being able to maintain such an officer, untrammelled with private practice, a union of two or three or more Authorities should be entered into with that view. —Dr. CARPENTER thought it was a subject for congratulation that the Sanatorium at Exeter was under the control of the Sanitary Authority rather than that of the Board of Guardians. To the general prejudice on the part of poor persons, who fancied that to enter such an institution would have the effect of pauperising them, was due a great deal of the concealment which was often found to have taken place. He agreed with the advisability, he might say the necessity, of having a Medical Officer of Health untrammelled by private practice.

Mr. W. E. C. NOURSE, F.R.C.S., read an Article on

THE PAST AND PRESENT PREVALENCE OF SEVERAL DISEASES, AS INFLUENCED BY FOOD, AND BY HOUSE-DRAINAGE;

and also related

FORTY CASES OF ILLNESS FOLLOWING SANITARY NEGLECT.

The following cases were submitted by Mr. Nourse from his own personal experience.

1. Several boys in a school of a superior class were attacked with typhus. There were three or four severe cases, and one death. Large cesspools existed close about the foundations of the house, and bad smells were at times perceived.

2. Two cases of typhus were received into a hospital. Similar cases had often been admitted, without any bad effects. But on this occasion the fever spread. Four persons, if not six, died, and about four more were dangerously ill. Bad smells had been noticed about the house; and shortly after the fever it was discovered that several enormous cesspools, full of fœtid matter, were under the foundations of the house, and that one of them in particular sent its vapours through numerous openings into one of the rooms.

3. A bad case of phlegmonous erysipelas was admitted into a London hospital. The patient stated that nine days before, a large sewer, passing under her house, was opened; and in the afternoon of the same day, she was attacked with shivering, which recurred for two or three days, when phlegmonous erysipelas came on. This patient died.

4. A lady died of typhus in a house, the drainage of which was supposed to be perfect. I examined the premises. On entering the back-yard, I was instantly sensible of a strong offensive smell, and on looking round for its cause, discovered a large open grating, communicating directly with one of the town sewers. This grating had never been noticed, and no doubt had emitted the poisonous malaria, which must constantly have entered all the back windows and doors of the house. Further search disclosed a long rat-hole opening beneath the dining-room floor, and passing directly into the same sewer. These and other matters were immediately put to rights, and no further illness arose.

5. A lady in London had low fever, which ran a very lingering course, ending in recovery. She had often been annoyed with offensive smells coming from the back of the house, believed to arise from a cow-yard.

6. A case of low fever occurred in a sea-port town, in a house near the quay. The town was drained into the harbour, and the mud at low water all along the quay sent up a considerable stench. The streets and alleys of this town abounded in cesspools and accumulations of filth; and fever was very common.

7. A case of febriculus also occurred there in a young man engaged in breaking up a dirty old ship.

8. An infant was attacked with capillary bronchitis. He lived in one of a nest of cottages belonging to an

owner too poor to keep them in order, and there were abominable collections of filth. The disease became asthenic, and the child died.

9. A father, mother, and several children, were all successively ill with inflammation of the mouth. Their cottage was absolutely without either ventilation or outlet, both at the sides and back.

10. A woman with phlegmonous erysipelas, caused by smells from a cesspool.

11. A child with low bronchitis and canker of the mouth, died. The residence was over a stable, and the smell of stable manure was constantly present in the rooms.

12. A boy with fever from foul air.

13. A boy with low bronchitis from foul air.

14. A boy with fever; foul air.

15. An infant with low bronchitis from foul air; relapse from continued exposure to the same; death.

16. A boy with low bronchitis; foul air; died.

17. A young man with typhoid, from bad water and foul air.

18. An infant with low bronchitis; foul air.

19. A little boy with measles, which took on an asthenic form, from foul air.

20. An infant with low bronchitis after measles, brought on by bad air; died.

21. A little girl with low bronchitis; foul air.

22. An infant with low bronchitis after measles, brought on by foul air. My notes mention several more cases of the same sort; some died, some recovered.

23. An infant with low bronchitis; foul air.

24. An infant; low bronchitis; foul air.

25. Infant; low bronchitis; foul air.

26. Infant; low bronchitis; foul air and bad food.

27. Little girl; low bronchitis after measles, brought on by foul air.

28. School-girl; low bronchitis; foul air.

29. Infant; low bronchitis; foul air.

30. Infant; low bronchitis; foul air and bad food.

The cases from No. 7 to No. 30 were dispensary out-patients visited at their own homes. In each there was distinct exposure to sewer gas, emanations from cess-pools, or the smell of stable-manure; which last I have always noticed to be highly deleterious.

31. Child with diphtheria. On entering the house, the smell of sewer-gas was instantly perceived; and on inquiry, it was found that the bell-traps had been removed from two sinks, and so had remained for some days.

32. An artizan came to me with sore throat. After inspection, I told him it was caused by sewer-gas. He assured me the drains, etc., were in perfect order in his house, and that he was excessively particular about such matters. After a few minutes, he suddenly recollected, that several days previously, he had been employed for some time in putting a lock to a door, where there was an offensive smell as from sewers, which annoyed him and seemed to get into his throat.

33. A young lady was ill for some days with asthenic bronchitis, after being exposed to emanations coming in at a window from a dust-hole which the dustmen had neglected to clear out.

34. A tradesman's wife was several times ill with asthenic bronchitis, from breathing exhalations from a refuse-heap.

35. A gentleman was attacked with tracheal catarrh, partly from getting wet, partly from breathing foul air, arising from the mud of a tidal estuary, and offensive emanations from a brook into which house-drainage fell. A lady was severely ill with influenza, brought on by the smell of the mud of a harbour at low water, to which smell she was once exposed for a few hours.

36. For some years the young children of a small tradesman were attacked once or twice a year with erysipelas of the head or face, sometimes one child, sometimes another. The closet, as usual, adjoined the house at the back, and I have no doubt that emanations from it got into the house.

37. During many years the children of a wealthy farmer were frequently ailing, though without any distinctly zymotic illness. Large farmyards were close to the house, around which the smell from manure, etc., was usually perceptible. I do not doubt that in this case, some of the illnesses were caused by these emanations, though this could never be ascertained with certainty. I was of a similar opinion respecting several other families, but could not trace anything out to act upon.

38. An infant [frequently ill with one ailment or other, lived in a house at the foot of a hill. The drainage was suspected, but not known, to be wrong. The child was moved to another house a little way up the hill, and from that time was always well and hearty.

39. An infant was ill with canker of the mouth, brought on by foul air and bad food.

40. A gentleman requested me to see his coachman who was ill with fever. He was living in well-appointed rooms over the stable, which was carefully ceiled; yet the smell of stable-manure pervaded the whole place, and I have no doubt helped to cause his illness. A fly-driver's wife, living in rooms over a coach-house, was suffering from low fever, which I attributed to the smell of stable-manure. In several other instances it has appeared to me that serious illness was caused by living over stables. A gentleman in London was made ill by the smell from the stable which penetrated into the dwelling-house.

One more case I must give. A gentleman was confined to his bed with a fractured patella. About the sixteenth day he was attacked with pneumonia, for which no other cause could be traced except the malaria from a neighbouring water-closet. The door of this was generally left ajar, and the place had, as usual, but a single window for ventilation. A somewhat similar case occurred with a woman in child-bed, mild typhus being the result.

These are but samples of much more that could be given. It is not safe to believe that the first rudiments of sanitary seience have been sufficiently taught. There are many people who either do not know them, or, what is even more frequent, do not attend to them and carry out their teachings. Cesspools are not yet things of the past. Refuse heaps, manure heaps, offensive trades, crowded collections of animals, yes, even sometimes of human animals, are not yet swept away. They are sometimes hid round corners, and in nooks, towards which the eyes of inspectors do not always seem to bend. I have seen nuisances, years ago complained of and supposed to be removed, still existing, and nearly in the original state; sanitary evils, long pointed out, not yet remedied; nuisances, which the arm of the law ought to have long ago reached, but which it seems to have no power to interfere with. In short, considering the talk and stir about sanitary matters which has gone on for these thirty years, and allowing for good things done and arrangements made, it looks as if some localities were not much the better for it all. It may be that health officers do not find themselves

sufficiently free to do their whole duty. It is certain that some of them are very insufficiently paid. And it is also certain, that sanitary measures are not yet supported by the voice and vote of the whole community, and that both the knowledge and the disposition to do these things rightly are not yet possessed by all.

A Century of Death-rates at Teignmouth.

Dr. W. H. Lake, Medical Officer of Health for Teignmouth, read this paper, of which the following is an abstract:—A few years ago I calculated for one of my annual reports to the Teignmouth Local Board the death-rate in the town for each year from 1795 onwards, and the mean for the ten years preceding each year. Then I have calculated backwards to 1780 and forwards to the present time, and have added for each year since 1838 the zymotic death-rate, the enteric fever death-rate, the number of births, and the birth-rate. Previously to 1838 the death-rate has been calculated from the number of burials registered in the churches and chapels in the town. The population before 1801 has been estimated from a record that, in 1791, the number of houses in the town was about 400, and in 1690 about 300, giving, according to the usual calculation, a population of 2000 and 1500 respectively. Before 1836, the water-supply of the inhabitants was derived from brooks and private wells. Public sewerage was scanty and imperfect, and the latrinal accommodation was of the out-door privy and cess-pit class, or altogether wanting. In 1836, an Act of Parliament was obtained for supplying the town with water, etc., and in 1859 the town placed itself under the Local Government Act, and from these dates to the present time the work of sanitary improvement has been carried on. Yet I would draw attention to the fact that, with all this, the death-rate was considerably and persistently higher after this work had been engaged in than it had been before, as shown more palpably by the column of death-rates for decennial periods, which then ranged from 12 to 14 in the decennials between 1813 and 1823, and from 16 to 17 in those between 1839 and 1848, ranging from 19 to 20 between 1852 and 1867. From that date they have again declined to 17.3 at the present time. To what is this owing? It may be said that burial-rates are not death-rates. In the four years, too, from 1838 to 1841, in which the number of deaths and burials are both given, they do not differ widely from each other; and, again, the burial-rates in the early part of the present century were decidedly higher than in subsequent years, and more nearly resembled those that afterwards obtained. I would rather explain it thus. Teignmouth, which during the last century was only a small fishing town, began at its close to be resorted to by visitors, and during the first thirty years of the present century had become a watering-place of fashionable repute. The rise of Torquay diminished this prosperity, and the population, which had risen from 2,012 in 1801 to 4,688 in 1831, declined in 1841 to 4,459. After the opening of the South Devon Railway in 1846, its population again increased, and probably stands now at 7,250. There have been thus, within the past eighty years, two periods of increased population, the one attended by a low, the other by a much higher death-rate. I would ascribe this increased death-rate during the latter period, and its occurrence, notwithstanding progressive sanitary improvements, to the increase in the population in the former period having been mainly that of the wealthier classes, and its increase during the latter period being mainly that of the poorer and labouring classes. The last ten years have seen an increase again in the wealthy classes, both among residents and visitors; but the visitors increasing the population principally during the summer and autumn months, while the census is taken in April, the death-rate of Teignmouth has always an extreme ratio unmodified by the effect which the presence of the migratory part of its population at an opposite time of the year would produce. This record thus not unaptly shows the preponderate influence in a death-rate which the presence of a large number of the poorer classes gives. But we must also recognise that many at least of the conditions tending towards increased mortality in such a case are conditions of the people in their private and individual circumstances and habits. I would therefore submit that in studying death-rates, for investigating the sanitary condition of a town or district, the relative proportions of the poorer and wealthier classes is a material element in the inquiry. During the last few years the death-rate of Teignmouth has materially diminished. I should not, however, look so much to this merely as evidence of the result of sanitary action, as to the decreasing death-rate from enteric fever. The mean of this from 1865 to 1869 was 0.55 per 1000; from 1870 to 1874, 0.52 per 1000; for the last five years it has been 0.39 per 1000. With regard to zymotics and zymotic death-rate, the general death-rate for 1797, 32.4, is the highest in the whole series, and principally resulted from fatal epidemic disease. I find that in 1829 there was a death-rate of 8.8 per 1000 from small-pox. Small-pox and scarlet fever were very fatal in 1849, and scarlet fever and measles in 1858. In 1857 diphtheria appeared for the first time, and in 1866 eight deaths occurred from Asiatic cholera. Subsequently to 1849, small-pox occasionally occurred, but not severely. During the last eight years one death alone has occurred from scarlet fever, that being an introduced case. In public opinion deaths from particular zymotic diseases are regarded as peculiarly preventable, by the action of sanitary authorities. But there are other diseases, whose mortality is equally preventable by sanitary means, and the diseases thus grouped are amenable to preventive measures. There is much in the progress of disease, and its relation to the condition we live in, of which we are ignorant; but this does not excuse us from acting on that of which we are not ignorant. Each year brings disease more within the grasp of sanitary control. By ensuring to the community pure air, pure water, wholesome surroundings, and the means of healthful development, we can not only remove the very cause of much disease, and increase vital power and the capacity of resisting it; but we may, by these same measures, ultimately succeed in blighting the seeds of the zymotic diseases themselves, or of destroying the means of their development.

Mr. Chadwick asked whether Dr. Lake had made up his mind how far the present death-rate for Teignmouth might be reduced?—Dr. Lake could give no positive answer, but he still had great faith in sanitary improvements to reduce the death-rate.—Dr. Richardson said the paper was a very valuable one, and was likely to create much discussion amongst sanitarians. It was a most singular fact that in several towns where the death-rate was low at the beginning of the century it was high now, in spite of sanitary improvements. There had been a rapidly increasing population at Teignmouth, and the death-rate would seem to have increased in the same ratio

with the increasing population, and in spite of seeming sanitary advantages. Now that Teignmouth had these advantages, we ought to see the result shown in the lower death-rate. The town now had a splendid water-supply, a fair drainage, and improved construction of houses; and its future death-rate would be a good test of the efficacy of present sanitary advantages. Dr. Richardson also agreed with Dr. Lake that many conditions under which the poor lived were beyond the reach of sanitarian legislation.—Dr. LEWIS SHAPTER argued that too much reliance should not be placed by medical men on death-rate.—Mr. KARKEEK, Medical Officer of Health for Torquay, stated that in Torquay they had pure water and tolerably good houses, and they hardly ever knew a case of zymotic disease among the poor, who had their conveniences out-doors. If typhoid occurred at all it was in the houses of the better-to-do people, who had water-closets and sculleries in-doors.—After Professor RAWLINSON had spoken, Mr. SYMONS called attention to the importance of Dr. Lake converting his figures into a diagram. He would like to know, also, whether Dr. Lake could trace any relation between death-rate and climatic conditions. Was it the case that in wet years, when the sewers were thoroughly washed out, the death-rate was lower? He could not come to a conclusion of these matters from the figures.

Mr. HENRY C. BURDETT read the following paper

ON THE NECESSITY AND IMPORTANCE OF MORTUARIES FOR TOWNS AND VILLAGES.

The subject of mortuaries is one that has received by far too little attention at the hands not only of those who are responsible for the practical carrying out of the public health laws of the kingdom, but even of ardent sanitary reformers. Yet it holds, or ought to hold, a prominent place in preventive medicine; and it differs from other sanitary appliances in having an important moral and social office as well as a hygienic one.

Those whose work has brought them into relations with the poor and the degraded know what additional terrors death brings with it when it occurs in wretched tenemented property, or in overcrowded cottage homes, where the same room has to act as dead-house, living-room, work-room, and not infrequently bed-room. Perhaps no more striking demonstration of the need for mortuaries has been made than by Mr. Chadwick, to whom was committed, early in the present reign, the task of collecting information about the sanitary state of the country, and subsequently as to the practice of interment in towns.*

Cases are constantly occurring in the experience of London coroners, whose evidence on this subject would be of the most instructive and startling kind. The dead body of a woman on whom an inquest was held by Dr. Hardwick in 1876 was kept in a miserable underground kitchen where the family lived; and where, after the work, the family slept and took their food by the side of the corpse until the burial took place.†

In a speech made before Mr. Sclater-Booth, in January 1876, Dr. Joseph Rogers cited the following case:—An old man died in a house in St. James' let out to lodgers. As it was thought his friends would bury the body, it was allowed to remain several days: indeed, until decomposition had so far advanced as to fill the house with effluvia. The sanitary inspector was then applied to, who, in his turn, applied to the master of the Westminster Workhouse for permission to take the body to the workhouse dead-house. The body was so putrescent that the workhouse attendants had to fill the shell with charcoal ere they dared to take it through the streets.*

At a meeting of the West Derby Local Board in March 1876, the sanitary inspector reported that in the course of his duties he had visited a house on the 23rd, and had found the body of a woman who had died on the 19th, lying in one of the rooms which was used as the sleeping-room of the family. The husband stated that, as he was too poor to inter the body, he had applied to the relieving officer to have it buried, but the request had been declined by the Board of Guardians. He then went to the clerk to the Local Board, who, after some delay, got an order from a magistrate, and the body was buried six days after death. The husband had slept, it was said, in the same bed in which the corpse lay.†

The corpse of a youth who died in a barge at Milton-next-Sittingbourne, from typhoid fever, contracted through drinking polluted water, was brought to his parents' house through the streets in an open van. On the arrival of the body the coffin was unscrewed, and remained so for two days before the burial. An outbreak of typhoid fever, confined to the street in which the body lay, subsequently broke out, and may possibly have been due to infection from the corpse.‡

M. Kœchlin Schwarz recently narrated to a commission of the French Society of Public Medicine—a society which has lately devoted much attention to the subject of mortuaries—a very painful case. In a small room rented by a workman, the father, attacked by small-pox, lay dying on the only bed, and round him his wife and five children, without fire or food, were waiting in despair till their turn came to be struck down by the disease. The mother, indeed, was in the anguish of child-birth whilst her husband was *in extremis*.§

Yet one more example. There are few sanitarians who do not know the labours amongst the poor of the Rev. Septimus Hansard, the rector of Bethnal Green. On the occasion of the recent opening of a mortuary for his crowded parish in June last, Mr. Hansard said:—The use of the building is two-fold—(1) As a mortuary or morgue for the reception of dead bodies, suicides, found drowned, nameless corpses, etc. (2) As a mortuary chapel. It was impossible to have been, as he had been, for the last thirty-three years a clergyman among the poor of London, without seeing the necessity for some such building as this, whither the inhabitants of the crowded dwellings of the metropolis might remove their dead, especially in times of epidemics such as cholera, scarlet or typhus fever. He gave three instances of such necessity out of many in his experience. In the time of the cholera, there was one night when nine lay dead of cholera in the houses of the church close or square near the parish church. The people all sat about in the streets, too frightened to go to bed; and in one place they were burning pots of tar from the windows of a room where a corpse lay. Again, it had in the course of his ministry been his duty to attend two medical men on their death-bed who, in the fearless discharge of their pro-

* *A Supplementary Report on the Results of a Special Inquiry into the Practice of Interment in Towns.* By Edwin Chadwick. London: W. Clowes & Sons. 1843.
† *Sanitary Record*, March 4, 1876.

* *Sanitary Record*, Jan. 15, 1876.
† *Ib.*, April 8, 1876, p. 252.
‡ *British Medical Journal*, October 25, 1879, p. 663.
§ *Revue d'Hygiene*, tome ii, p. 41.

fession, had fallen victims to confluent small-pox. On both occasions the relatives had immediately after death removed the bodies to outhouses. On another occasion he saw, in a room not larger than an ordinary closet, three victims of typhoid lying dead, with five people eating, drinking, sleeping, and living in the same room. Things like this in a professedly religious and Christian country were disgraceful. Here, surely, were proofs of the need of such a mortuary chapel as had just been opened. But not only in case of epidemics would this building be used, but at ordinary times. There were two rooms in the chapel, each capable of containing thirty coffins. One might be set apart for those which required an inquest, or for infectious bodies, the other for those brought thither by sorrowing friends, who could cover the coffin with a pall, and come and take their last look at their beloved ones, surrounded by the emblems of Christian hope. That was why he had desired the building to be called a chapel; not that masses for the dead should be said there, but to throw the sanctity of religion over the building.

All sanitarians agree in thinking that in large or crowded towns a properly constructed mortuary is of the first necessity; and there are reasons for thinking that in rural districts also, some provision of the kind would be extremely valuable and save much present scandal. The dwellings of agricultural labourers and their often indecent overcrowding need no description at my hands: and what is to be done in such a case when a death occurs? Evidently the dead must be left in very unwholesome and distressing proximity to the living in the absence of a mortuary or dead-house, which thus becomes a necessity throughout the country.

I will now direct attention to the remedy for this regrettable state of things, viz., the provision of reception or dead-houses, in which corpses may remain pending interment.

The able and comprehensive report by Mr. Chadwick, to which I have already alluded, may fairly be considered as the starting point, amongst other things, of mortuaries. The report was published in 1843, and evoked much attention and discussion. With the more comprehensive report which preceded it, on the sanitary state of the labouring population of Great Britain, it unquestionably paved the way for the passing of the Public Health Act of 1848. In that Act (11 and 12 Vict., cap. 63) there was a section (No. 81) which provided that for the regulation of interments in districts to which that Act applied, Local Boards might provide reception houses for the dead, and make by-laws with respect to the management of the same, and, on application make arrangements for the interment of any corpse contained therein. This clause was practically superseded by section 27 of the Sanitary Act, 1866, but was not formally repealed until the Consolidating Act of 1875.

The law remained in this state for nearly twenty years, but meanwhile the subject had received a certain amount of attention both at home and abroad. In 1852, there was a general Sanitary Congress at Brussels, and part of the third question for discussion was:—'What can be the usefulness of mortuaries, and, for the cases in which this usefulness is recognised, what should be their organisation?' Amongst those who made a firm stand on that occasion for this question being one proper for discussion by the Congress (in opposition to those who would have ignored it on the ground of its touching questions of religious feelings and family affection), Earl Fortescue, then Lord Ebrington, made himself conspicuous. After discussion, the Congress declared the usefulness of mortuaries in each parish, and, on the motion of Lord Ebrington, it was resolved that:—'Convinced of the great inconvenience of keeping corpses in inhabited rooms, the Congress declares the usefulness and earnestly recommends the establishment of mortuaries.'

The Sanitary Act of 1866 (29 and 30 Vict., c. 90) improved the state of the English law as to mortuaries. By section 27 of this Act, 'nuisance authorities' (equivalent to our existing local authorities) were empowered to provide a proper place for the reception of dead bodies, and thereupon a justice, with a medical certificate, might order bodies to be removed to it, and cause removal if the relations failed to obey, charging them with the cost. The authorities were also empowered to provide places for *post mortem* examinations (section 28).

The Royal Sanitary Commission, commenting upon section 27, observed that 'although there is this power by law, it appears to be very little exercised, and the evils of keeping the dead in the same room with the living exist very extensively amongst the poor, and this evil is aggravated by the general practice of wakes among the lower classes of the Irish Roman Catholics, who are very numerous in some large towns, such as Liverpool.*

The Commissioners suggested that power should be given to the Central Authority to compel a Local Authority to provide a mortuary; and that, even when there was no mortuary, the justice should be enabled in the cases specified in section 27 of the Sanitary Act, to give an order for the removal of the body from the house. To facilitate the acquisition of parts of closed burial grounds or of land in cemeteries for mortuaries, the Commissioners suggested that the Local Authority should be empowered, in the case of any closed burial ground, to purchase by contract any part of such burial ground from those in whom the site and control were vested, for the purpose of erecting thereon a mortuary, and (if needful) a residence for the keeper. The Commissioners formulated, however, certain provisoes to this transfer, and as these provisoes contain much suggestive matter in a small compass, I give them in full:—

'1. This shall not authorise the purchase of any piece of land if it necessitates the disturbance of bodies already buried.

'2. Nor if the piece to be purchased cannot be approached without passing through any other part of the closed burial ground.

'3. No religious service shall be held or celebrated in any mortuary erected in any closed burial ground.

'4. Such mortuary and residence house (if any) shall be separated by a wall or fence from the rest of the burial ground.'

The Consolidated Public Health Act of 1875, whilst re-enacting the sections of the Act of 1866 as to mortuaries, made their provision by the Local Authority compulsory in cases where the Local Government Board required. The Act of 1875 does not, however, extend to the Metropolis, which, in this respect, is worse off than the country, for the Local Government Board have not the power, even if they felt inclined to exercise it, to compel the erection of a mortuary in London. In Scotland, legal power is given by section 43 of the Public Health Act of 1867 (30 and 31 Vict., cap. 101) to provide a place for the reception of dead bodies, and to remove

* *Second Report of the Royal Sanitary Commission*, Vol. i, p. 50.

bodies to it in certain cases. Nothing is said, however, with regard to *post mortem* rooms. In Ireland, provisions similar to those in the English Act are contained in sections 157, 158, and 159 of the Public Health (Ireland) Act, 1878, and there is this important addition:—'The body of any person who has died of any dangerous infectious disease in any hospital or place for the treatment of the sick shall not be removed from such hospital until removed direct to a mortuary or cemetery, and any person violating, or any officer of an hospital or other person who knowingly permits the violation of this provision, shall be liable to a penalty not exceeding five pounds.'

Seeing the unsatisfactory state of the law, Dr. Joseph Rogers, whose services in connection with sanitary work are well known, and who, some twenty-four years before, had the principal share in the establishment of the mortuary at St. Anne's, Soho, which was for several years the only one in the Metropolis, moved, in the year 1875, at the Strand Board of Works, that 'With the view of the more effectually and economically securing the establishment of mortuaries in the different parishes of the Metropolis, this Board do memorialise the Metropolitan Board of Works, urging that Board to apply for powers in the next Session of Parliament, authorising that body to undertake their erection in such parts of the Metropolis as may be considered necessary.' The Metropolitan Board declined, however, to take up the subject, on the grounds that the mortuary question is beset with difficulties in London, and is one which should be dealt with by the Local Boards, and not the Metropolitan Board.* The Strand Board of Works deemed it necessary, however, to interview the then President of the Local Government Board, for the purpose of securing the aid of his Department in establishing mortuaries in different parts of the Metropolis. A deputation from that body waited upon Mr. Sclater-Booth in January 1876, when Dr. Rogers made a lengthy and telling speech in favour of the extension of mortuaries, winding up by formulating the points that should be attended to with reference to the question.† These were: '1. That it should be made compulsory on every Local Board to establish a suitable mortuary, on a common plan, to be approved of by the Local Government Board or the Metropolitan Board of Works. 2. That these mortuaries should be in the proportion of not less than one to every 50,000 inhabitants. 3. That powers should be provided for the compulsory purchase of property under the provisions of the Lands Clauses Act, and for enabling parishes, or portions of parishes, favourably situated for such purposes, to combine to form mortuary districts; such mortuaries to be maintained at their joint expense, and for their common use. 4. That the Medical Officer of Health, or the Poor-law Medical Officers, or the Relieving Officer, should be empowered and directed to order the removal of a corpse to the district mortuary in all cases where it was found that the family, at the time of such death, occupied only one room, and in such other instances where it appeared desirable to these officials to direct the same.'

Not much of promise was extracted from Mr. Sclater-Booth; but he undertook to confer on the subject with Mr. Cross, who, as Home Secretary, had more control over the vestries than the Local Government Board had. In the ill-fated Public Health (Metropolis) Bill of 1877, which Mr. Sclater-Booth introduced with the view of making the public health law uniform for the Metropolis and country, clauses were inserted re-enacting the clauses in the Sanitary Act, 1866, bearing on the question, but making the provision of a mortuary compulsory, if the Local Government Board so directed. The fate of this Bill is, however, well known; and we are now, in the Metropolis, almost as badly off as ever, certainly as badly off for any reasonable system of the disposal of the dead pending interment. I think, therefore, that this is a subject which is eminently worthy of the attention of this Institute, and I would suggest for consideration, whether it might not be expedient and useful for the Institute to take up the question where it was left in 1876, and endeavour to induce the new Government to make a move with regard to this important branch of public health machinery.

I will now offer some suggestions for the establishment and management of mortuaries.

I must premise that these suggestions are not intended to exhaust the subject. They are suggestive merely, and are offered in the hope that they may help to a better understanding of a question on which far too little is known. Not the least of my difficulties in approaching this subject has been the extreme paucity of the information given about it by standard authorities.* The word mortuary does not appear in the index to any book on Hygiene with which I am acquainted. I have, therefore, had to rely very much upon the facts which I have been able to pick up in the course of my reading, and upon my practical experience of the requirements of such erections.

It may be, and has been urged, against the erection of mortuaries, that even if they were established, poor people would with difficulty be got to allow their dead to be taken there. The law recognises this difficulty, and section 142 of the Public Health Act provides that 'When the body of one who has died of any infectious disease is detained in a room in which persons live or sleep, or any dead body which is in such a state as to endanger the health of the inmates of the same house or room is retained in such house or room, any justice may, on a certificate signed by a legally qualified medical practitioner, order the body to be removed, at the cost of the Local Authority, to any mortuary provided by such Authority, and direct the same to be buried within a time to be limited in such order.' This section, it will be observed, is of very wide application; for it cannot be doubted that many dead bodies, not necessarily those of persons dying of an infectious disease, are in such a state as to endanger the health of the living inmates of the house or room in which the bodies are retained. Yet, unless a mortuary is provided, there is no legal power to deal with the body, and it may remain a source of the gravest injury to the public health of the neighbourhood. The establishment of a mortuary is then an imperative duty for Local Authorities throughout the kingdom.

Mortuaries have been provided in this country in a great variety of ways. There are first of all the

* *Sanitary Record*, Vol. ii, 1875, pp. 165 and 325.
† *Sanitary Record*, January 15, 1876, p. 44.

* For much valuable information showing the need for mortuaries, reference may be made to Mr. Chadwick's *Report on the Practice of Interment in Towns* (Clowes, 1843), and to the Report of the General Board of Health *On a General Scheme for Extramural Sepulture* (Clowes, 1850). Dictionary articles on the subject will be found in *Tardieu's Dictionnaire d'Hygiene*, article 'Morgue' (Baillière, Paris, 1862); Wynter Blyth's *Dictionary of Hygiene*, article 'Mortuary' (Griffin, London, 1876); and Pappenheim's *Handbuch der Sanitats Polizei*, article 'Leichen-polizei' (Hirschwald, Berlin, 1870). In the second edition of the writer's book on *Cottage Hospitals* (Churchill, 1880), an attempt has been made to deal with the question of mortuaries, more particularly from the point of view of their relation with hospitals.

separate erections, with *post-mortem* room and coroner's court, such as the mortuaries in the City of London, at Islington, Clerkenwell, and in some of our large towns. There are the mortuaries provided by Sanitary Authorities, in connection with infectious hospitals that they have established. There are the mortuaries provided at cemeteries, or on licensed burial grounds. And there are the mortuaries, if such they can always be called, provided at general hospitals for the bodies of persons dying in the institution, but rarely thrown open to the outside public. These latter, however, are not public mortuaries in any real sense of the word; they are simply furnished for the convenience and use of the hospital authorities, and for *post-mortem* purposes, and are intended, in addition, for the purpose of keeping the corpses out of the wards until the time comes for burial. Indeed, it may safely be said that no mortuaries, in any comprehensive sense of the word, exist at hospitals.

Of mortuaries proper, all sorts and sizes exist, from the elaborate erection provided at a cost of £12,000, by the City Commissioners of Sewers, in Golden Lane, —comprising a mortuary chapel, with twelve slate tables, keeper's house and offices, coroner's court, laboratory, weighing room, consulting room, dead-house fitted for *post-mortem* examinations, disinfecting apparatus, ambulance shed, shed for disinfecting apparatus—down to the old parish dead-house or pest-house, which has in some places been utilised for the purpose, and is almost, if not quite, destitute of all furniture.

One of these pest-houses is to be found at Greenwich, where it stands in the churchyard, to the disgrace of the Local Health Authority.

I will now proceed to sketch out certain features of a mortuary, as regards its establishment, situation, and regulation.

And first, as to its establishment, I have already mentioned in a former section that, under the Public Health Act of 1875, any Local Authority may, and, if required by the Local Government Board, shall, provide a mortuary, and may make by-laws with respect to the management and charges for its use. They may provide for the decent and economical interment of any dead body received into a mortuary (section 141). To this mortuary a justice may, in certain cases, order the removal of a dead body (section 142). The Local Authority may also provide a place for *post-mortem* examinations ('otherwise than at a workhouse or a mortuary'). As to this proviso, I shall have more to say later on. Thus it is to Local Sanitary Authorities that we must mainly look for the establishment of these temporary resting-places for the dead.

But it has struck me that when the Local Authority is unwilling to perform this necessary duty, or has difficulty—which I know to be sometimes a real difficulty—in procuring a suitable site, that then another method might be devised for securing the establishment of a mortuary. Most hospitals make some sort of a provision for deaths occurring within their walls; and I think that if Sanitary Authorities felt disposed to help, hospital managers would often be found willing to erect a somewhat more pretentious mortuary than they would otherwise have done, and to throw it open, under certain regulations, to the general public. The rapid extension of cottage hospitals leads one to hope that this method of securing mortuaries would satisfy the demands of a large and increasing number of places. It is a common practice for Local Authorities to subscribe to hospitals—especially to infectious hospitals—provided by private enterprise; and I am not aware of any legal objection to the same power of subscription being exercised in the case of mortuaries. Indeed, the utility of a mortuary is usually more obvious to Local Authorities than that of a hospital, so that probably this plan has only to be suggested to secure adhesion to it.

Another method in which mortuaries—especially on the Continent—are provided, is to erect them in cemeteries. There is much to recommend this plan, both on the score of economy and of regard for the public health. Such mortuaries are of course provided by Burial Boards, who need not be, and as a rule are not, the Sanitary Authority of the place. In this connection it may be worth while to observe that, whilst section 142 of the Public Health Act grants the power of compulsory removal of dead bodies to a mortuary provided by a Sanitary Authority, it does not do the same in the case of a mortuary provided by a Burial Board. This seems a very absurd and unnecessary restriction, and may be commended to the attention of our legislators. In addition to the advantage of freer space and cheaper administration —for the cemetery-keeper could be instructed to supervise the mortuary as part of his duties—mortuaries at cemeteries enable the corpse to be taken direct to the grave, without the necessity of a hearse and its attendant expenses. At the mortuary established by the Hampstead Burial Board, at their cemetery at Fortune Green, there is a wholesome rule requiring that, in the case of persons dying of infectious diseases, whose corpses are received into the mortuary, the friends must meet the corpse at the cemetery, and not at the mortuary, from which the body is carried direct to the grave. For ordinary cases of death it would be well to have a separate waiting-room provided for the mourners to assemble in, on the day of burial, as is done (not, indeed, at a mortuary established at a cemetery) at the mortuary at Dean Street, Soho. Seeing, then, the obvious advantages of mortuaries at cemeteries, it may be worth consideration whether, in the establishment of all new cemeteries, provision should not be made in the plans for a building, of a nature of a mortuary, to receive dead bodies preceding interment. On this point the evidence of the late Mr. Robert Baker, one of Her Majesty's Chief Inspectors of Factories, is peculiarly valuable. When examined before the Royal Sanitary Commission, on January 17th, 1870,* Mr. Baker said that he 'wished strongly to express that he thought at every cemetery there should be a mortuary for from one to fifty bodies, with locks and keys, the numbers of the cells and keys to correspond; and he thought it would be desirable, in non-contagious deaths, that the bodies of the poor should be conveyed, soon after death, to these mortuaries, and, if the people were needy, at the public expense; and the key should be given up to the relatives to the time of interment, which should be fixed, in order to avoid offence, in the summer time' (Q. 9407). Asked whether he would make the removal optional in non-contagious diseases, and compulsory in the case of contagious diseases, he answered in the affirmative; and he thought again that in case of contagious diseases it should be compulsory to have the body placed within a shell, within a coffin (if it be desirable that it should be kept for the arrival of friends), between which and the shell there should be an interstice of pitch; the lid of the shell being also pitched on, but with a glass over the face (Q. 9408). The expense of

* *Second Report of the Royal Sanitary Commission*, Vol. iii, Part 1, page 53.

such removal Mr. Baker would, in the case of poverty, throw upon the parish.

We have next to consider the question of *situation*. On this much needs to be said. Whenever possible, the mortuary should of course be separated by a belt of air from all dwelling houses; but no injury has been found to follow the use of those in very crowded neighbourhoods, even when they abut on the street. The mortuary in Drury Lane, the walls of which are brought up flush with the pavement, is an instance of this. The Drury Lane mortuary, like a great many others in the Metropolis, has been built on an old disused burial ground; and certainly these spaces, occurring as they do in the most crowded parts of the town, afford a very convenient site for mortuaries, a site, too, which the ordinary prejudices of people against the establishment of receptacles for the dead in their midst can hardly reach.

Wherever possible, a mortuary should be screened from the road by trees or shrubs, and should be approached by a winding path, also planted with shrubs.

The internal arrangements and fittings are most important. There should be ample means of ventilation provided for every part of the building; and the mortuary, though not made too bright by window space, should not be gloomy or depressing in appearance.

Though, of course, a mortuary proper would consist merely of a dead-house, it is essential that connected with it should be a room for *post-mortem* examinations, and another for the holding of coroners' inquests.* For it must be remembered that a certain, and in some cases not inconsiderable, portion of the bodies brought into a mortuary will be for identification and legal inquiry—as of persons found drowned, or dead in the streets, murders, suspected suicides, unknown strangers at hotels, etc., etc., and suitable provision must therefore be made, not only for a skilled medical examination of the body to discover the cause of death, but also for the coroner and jury to hold inquests on the bodies.

The most objectionable and undignified custom of holding inquests at inns and taverns—not unfrequently amidst the noise and bustle of business in a low neighbourhood—hardly needs condemnation at my hands. If all mortuaries had a room fitted up as a coroner's court, the present indecency of inquests might, to a large extent, be done away with.

The size of the mortuary room proper must, of course, be large, and will depend upon the population of the district for which it is to serve. Space for some twelve bodies has been held by Dr. Hardwicke, the energetic Coroner for Central Middlesex, to be quite sufficient for a large town. The bodies may be placed in shells or coffins resting either upon tables covered with zinc or other impermeable material, or upon trestles, or upon movable iron brackets fixed round the walls. At some of the London hospitals, catacombs the size of the coffin and made of slate or brickwork, are used; and for certain purposes these may be found useful.* Since some of the bodies are certain to be brought in in an advanced stage of decomposition, a stock of charcoal and disinfectants should be kept. Any good disinfectant may be employed, but as the chlorides act most powerfully in preventing decomposition, it would, perhaps, be preferable to use them. If carbolic acid be employed, a strong solution must be used. If the dead are in an advanced state of decomposition before they are received, they should be surrounded with sawdust and carbolic acid powder before being screwed down, to prevent annoyance and injury to health. Cloths for covering the dead, which should be frequently saturated with disinfectants, should be provided.

It is important that the mortuary should have in readiness some shells or coffins for the holding of corpses whilst a proper coffin is being prepared. It has been suggested that the person desiring to make use of the mortuary should provide these: but experience teaches—as indeed was to be expected—that it is far preferable for the managers of mortuaries themselves to have on hand a few such shells, which can be sent from the mortuary to the place from which the body has to be removed. The Islington Vestry, having experienced difficulties in the use of their admirable mortuary with regard to this question of shells, ordered some of different sizes, made of wood and lined with tinned copper, to be kept at the mortuary for use when required. These are cleansed by the mortuary keeper after each occasion of use. A good rule at this mortuary is that no wooden shells may be removed therefrom except when used to bury in. If a body be transferred from it to a coffin for burial, the shell is sprinkled with disinfectants, split up, and burned. At Clerkenwell, the City, and Drury Lane mortuaries, there are also shells belonging to the authorities in readiness for similar emergencies. At every mortuary there ought to be at least one or two air-tight coffins, with glass lids, for convenience of viewing the bodies on which inquests are held—an ofttimes very distressing and disgusting ceremony for the jurors. Or a well-made movable case, with glass on the top, might be provided for placing over bodies on which inquests are to be held. The glass should be fixed in a frame hung on hinges, so as to admit of the free use of disinfectants after the case has been placed over the body.

The *post-mortem* room may adjoin, but should be quite distinct from, the mortuary. This separation is needful in order to comply with the terms of section 143 of the Public Health Act, which, whilst giving powers for the erection of *post-mortem* rooms, distinctly requires that they must be provided 'other than at a workhouse or a mortuary'. Mr. Lumley, in his comments upon this section, observes that 'This exception deserves special attention. It is desired that places should be provided for the removal of dead bodies from the rooms of poor people when they die, and it would create a repugnance on the part of the relatives to such removal in many cases, if a suspicion arose that such bodies might be subject to anatomical examination.† This, no doubt,

* The necessity for this provision was conclusively demonstrated at an inquest held last week by Mr. W. J. Payne at the St. George's Workhouse, Mount Street, on a child a day old, which had died from inanition. The Guardians had refused to admit the body into the house, and, in consequence, the Jury were obliged to view the body on the street-doorstep. The Coroner stated that he believed the cause of this extraordinary prohibition was the fact that there was a little room called a mortuary at the back of St. George's Church, to which the Guardians thought all bodies should be removed. There was no room there, however, in which to hold an inquest, and no convenience whatever for the purpose, except the tap-room of a public-house, to which both he and his jurors had a great objection. The St. George's board-room had been used as an inquest-room, it appears, for over fifty years; but from the refusal of the Guardians to grant its use on this occasion the unseemly scene above described originated. It may be hoped that the public attention directed to it may result in a proper and decent provision.

* In certain cities of the Continent there are mortuary chambers in the form of separate cells completely isolated, in which it is contemplated that families can mourn and watch their dead until the time comes for interment. With these, as being wholly religious structures, I do not propose to deal.

† *The Public Health Act*, 1875, *Annotated*. By W. G. Lumley, LL.M., Q.C. (Shaw and Sons, 1876), p. 115.

is the feeling which has prompted the legislature to make so positive a prohibition. It is only necessary, however, to take care that the *post-mortem* room is distinct from the mortuary (*i.e.*, that it is walled off from it, has a separate entrance, and is cut off from it in other ways), to comply with the Act of Parliament. As to the fittings of the *post-mortem* room, I cannot do better than quote from a paper on the subject of mortuaries which was read before this Institute at its Stafford meeting in 1878, by Dr. Hardwicke, whose very large experience gives to his utterances peculiar value. Dr. Hardwicke recommends that the *post-mortem* room should be used only for the uncoffined or unclaimed bodies awaiting identification, and ought to be kept cool in summer by a supply of cold water; the corpse having sometimes to be preserved as long a time as possible from decomposition. This room should be furnished with special appliances necessary for *post-mortem* examinations; a marble or slate slab, with sides sloping towards the centre, converging into a drain below, so that fluids may not run over the edges; a sink with a plentiful supply of cold water; an iron bowl; a coarse sponge; a jack towel, a wooden yard measure; and, for the weighing of organs and structures, a set of weights and scales; a slated footboard around the slate table, on which medical men making *post-mortem* examinations may stand free from the damp or cold floor. Gas should be laid on, so as to procure warm water, or as it may be found necessary to make the examination at night, or when the darkness of winter days may obscure the view of the subject.'

A great deal of the success of a mortuary depends upon the efficiency of its keeper. The appointment of such an officer is absolutely necessary if scandal is to be avoided; but as to the amount of work to be required of him, everything must depend on the circumstances of the case. In mortuaries at cemeteries, the cemetery-keeper may properly supervise the mortuary; in mortuaries at hospitals, the porter or gardener; but as to mortuaries standing by themselves, no rule can be laid down. The duties, however, of the keeper have been thus defined by Dr. Hardwicke in the paper already quoted:—

'His duties would be to receive under his charge not only bodies brought in by relatives and friends of the deceased, but those found dead by the police, or from accidents, or cases sent to the mortuary by the coroner's officer to await an inquest, or by the medical officer or sanitary inspector of the district, in order to relieve an overcrowded dwelling of a corpse dying from an infectious disease, or in a state of dangerous decomposition. He must act under fixed rules, and become responsible for the safe custody of these bodies and such articles of clothing as may accompany them. He must attend to the proper cleansing, disinfecting, and ventilation of the rooms generally, but especially of that used for *post-mortem* examinations and the room used for the reception of a corpse dead from an infectious disease. He must render some assistance to medical men who are called to make *post-mortem* examinations, in the placing of the corpse in and out of the shell; and his attendance is required upon persons visiting either for the purpose of identification or seeking information relative thereto. It is of the utmost importance that a mortuary keeper should live very near the mortuary, so that he may always be ready at all times to receive bodies. He should also keep a register of the mortuary, containing the date, name, sex, age, address, and other circumstances appertaining to the bodies to be removed; such as by whom, where to, or to what cemetery, or by what undertaker.'*

The next point to consider is the regulation of mortuaries. As to this it seems to be generally agreed that the fewer regulations there are the better. Restrictions or forms of recommendation only tend to lessen the usefulness of mortuaries, and the best plan is to throw them open to every one who chooses to send a corpse thither. Dr. Letheby, in 1871, drew up an elaborate set of rules for the City Mortuary, but practically these have now fallen into complete desuetude. The subjoined rules in force at the mortuary provided by the Islington Vestry in the Chapel of Ease grounds, Holloway Road, will be found to contain all that is essential in the matter:—

'The dead body shall be enclosed in a proper shell or coffin, such being the shell or coffin in which the body is to be buried, and shall be conveyed to the mortuary chamber, and also removed therefrom in a hearse, or otherwise in a decent and proper manner, and the undertaker or friend shall remove the dead body for interment within an ordinary specified time.

'In case the undertaker or friend fail to remove the dead body within the time specified, notice shall be given to the relieving officer of the parish to bury such body at the expense of the poor-rate, such expense being subsequently recoverable from the parties legally responsible.

'A body having been brought or sent by any person whatsoever to the mortuary in a shell or coffin, such shell or coffin shall, under no circumstances, be removed other than for the burial of the body contained therein, unless such shell or coffin with the lid be properly lined with tinned copper.

'Should any shell or coffin sent with a body prove to be in a defective condition, a thoroughly sound and larger shell must upon notice be supplied, in which the defective shell can be enclosed, or in default the sanitary superintendent shall order a proper shell to be provided, and the expense will be recovered from the party sending such defective coffin.'

As to the reception of cases, there is a useful rule at the mortuary at Dean Street, Soho (which is under the control of the Burial Board of St. Anne, Westminster), empowering the attendant to receive a body without an order (otherwise necessary from a member of the Burial Board), if it be accompanied by a policeman or known inhabitant. At the mortuary in Drury Lane, which was established some years ago by Lady Burdett Coutts, Lord Vernon, and other benevolent persons, on the disused burial ground of the parish of St. Martin-in-the-Field, there is a rule forbidding the admission of any public procession or large assemblage of persons into the grounds on the occasion of the admission or removal of the body. Only the immediate relatives, the undertakers, and bearers are allowed on the premises. A commendable rule, which deserves imitation.

At this last mortuary bodies are received from 8 A.M. to 8 P.M. from September 1 to April 30, and 8 A.M. to 10 P.M. from May 1 to August 31. Practically it would be found best to impose no limitation on the hours when bodies are to be received, as it may often happen, especially during epidemic periods, that it is essential that the body of a person dead of infectious disease should be removed instantly. It might be well, however, to have a general understanding on the subject, as at the City Mortuary, where all bodies are systematically removed by 11 P.M., though there are no specified hours named.

* The scheme of duties for the keeper drawn up in 1871 by the late Dr. Letheby for the City Mortuary, or the Islington rules based upon it, may be recommended for general adoption.

No charge should be levied on the relatives of the persons whose bodies are deposited in the mortuary, as it is very important to encourage its use as much as possible. At none of the mortuaries of which I have information is such a charge made. The expenses of inquests held at the mortuary would of course be paid by the coroner.

The visits of friends and relatives need a word of mention. In most of the mortuaries with which I am acquainted there is no limitation to the unrestricted visits of friends within reasonable hours. At Drury Lane mortuary the number of persons is restricted to three, between the hours of nine in the morning and sunset; and at Hackney, where two mortuary chambers (one for accidents and non-infectious diseases, and the other for infectious cases) have been provided, no one is allowed in the infectious disease chamber. At this mortuary infectious corpses are wrapped up in a sheet soaked with carbolic acid and water, and are placed in a shell when they arrive if they are not brought in one. They are then transferred, as soon as possible, to a coffin in which sawdust and carbolic acid have been put, and the coffin is screwed down.

This leads me to the question whether or not it is necessary in providing mortuaries to have a separate chamber for infectious cases. I do not think that this separation will usually be found necessary, though, of course, there is an additional precaution when it is done. All infectious corpses ought certainly to be dealt with as at Hackney, and should be screwed down as soon as possible, a piece of glass being let into the lid of the coffin in cases where it may be considered expedient or be desired by the relatives. The question whether it should not be compulsory, without the necessity and uncertainty of applying to a justice, to send infectious corpses to mortuaries from houses where proper separation cannot be observed, is one upon which I can hardly express a decided opinion. It appears to me, however, to be eminently desirable from a sanitary point of view, and to offer hope of helping to diminish our yearly death-roll from preventable disease.

The public ought to have easy access to mortuaries, and every reasonable facility should be offered them for so doing.

In those cases in which the body of a person is found drowned or unknown, or in other ways undistinguishable, provision should be made so that all the clothes of the deceased may be exposed to view. At present it is by no means easy for people who desire to view the body of unknown persons to accomplish their desire; and the natural consequence is that they come not to care to do so. The number of persons annually consigned to mother earth whose names and stations in life are utterly unknown is very large; and it cannot be doubted that if more easy means of identification were provided, as by the exhibition of their clothes, we might reduce the number to an appreciable extent. Moreover, in this manner foul play might more readily be detected, and mysterious disappearances cleared up. When it is borne in mind that of the three or four hundred persons annually exposed at the Morgue in Paris, half the identifications are due to chance; and that since greater facilities for the public entry to that institution have been made, the identifications have increased from barely three in every four bodies to nearly eight in nine, and that the police have been greatly assisted in the detection of crime, the importance of reasonably free access to a public mortuary will be recognised. I must guard myself against being supposed to advocate the setting up of an institution like the Morgue in England, for the sensational sights exposed to public view in that building are clearly very undesirable. It is, nevertheless, of great importance to allow such free access as may help to assist in clearing up a mystery or may lead to the detection of a crime. Of course, the gratification of mere morbid curiosity must be strongly discouraged, but it would not be at all difficult to do this with proper regulations. Many of the identifications at the Morgue, which is the most complete institution of its kind extant, are made through the clothes of the deceased being conspicuously exposed; and the importance of preserving all articles of dress worn by an unrecognised corpse must therefore be strongly insisted on. At the Morgue a special room is provided for the retention of clothes of the unrecognised dead for from six to eight months after burial; but the number of deaths of persons unknown is likely to be so small at ordinary mortuaries that a box or press would be quite sufficient for the purpose.

I wish to say a few words as to the burial arrangements to be made by the managers of mortuaries. The length of time that should elapse between the reception of the body and the burial is of some importance; and it will be observed that the justice's order referred to in section 142 of the Public Health Act may direct a body 'to be buried within a time to be limited in such order'. It becomes, therefore, of moment to know what should be the maximum time allowed. In England we have no power of requiring burial within a fixed period from death, though it is eminently desirable that we should have this power. It may not, perhaps, be generally known that in a Bill of 1842 there was a clause which proposed to provide that 'from and after the first day of October, one thousand eight hundred and forty , if any dead body shall continue unburied between the first day of May and the thirty-first day of October, both days inclusive, more than hours, or between the first day of November and the thirtieth day of April, both days inclusive, more than hours, the executors or administrators to the estate and effects of such deceased person, or the friends or relatives of the same, or any one of such friends or relatives present at the burial, or the occupier of the house from which such dead body shall be removed to be buried, shall forfeit the sum of twenty shillings for every twenty-four hours after the expiration of such respective periods.'

Nothing, however, came of this, and I do not think the question has again been raised. On the Continent, however, and in America, the state of affairs is different. Thus the New York Board of Health, whose sanitary regulations are extremely full and careful, have ordered that 'no person shall retain, or allow to be retained unburied, the dead body of any human being for a longer time than four days after the death of such person, without a permit from the department, which permit shall specify the length of time during which such body may be retained unburied'. It would seem, therefore, wise to take this standard, and make regulations to the effect that a body must be removed from the mortuary within four days of the death. At Drury Lane every corpse must be removed for interment within six days from the date on which the death occurred. Corpses of persons dead of cholera must, however, be removed within two days, and those dead of other dangerous infectious diseases within three days, power being reserved to the Medical Officer of Health to order the interment of a rapidly decomposing corpse at any time.

As to the actual arrangements for interment, not much needs to be said. The portion of the Act dealing with this matter is not particularly clear, but Mr. Lumley, in his comments upon it, seems to think the interment of bodies from a mortuary should, when necessary, be performed by the Sanitary Authority. In practice, however, burials from a mortuary that are not paid for by the relatives are performed by the Poor-Law Authority, *i.e.*, the Guardians. So far as I know, no legal question has yet arisen as to the interpretation of this clause; and probably it would be better not to disturb the existing arrangements.

Mr. WOODMAN said that Exeter had a mortuary. He could trace both disease and death to dead bodies being allowed to remain in the houses of the poor longer than they should have been.

Dr. SLADE-KING, of Ilfracombe, contributed some NOTES ON THE SPREAD OF DIPHTHERIA.

In the evening, by the invitation of the Bishop of Exeter, all the holders of Congress tickets were entertained at a *conversazione* at the Palace.

The third day of the Congress was devoted to

SANITARY ENGINEERING.

The President of the Section was Mr. RAWLINSON, C.B., who delivered an Address on

OLD LESSONS REVIEWED AND NEW LESSONS CONSIDERED;

of which the following is an extract:—

Calcutta has been partially sewered, Bombay is now in course of being sewered, and preparations are in progress for sewering and draining other Indian cities. Sewerage works at Berlin are also in progress, to be completed with sewage irrigation. Dantzig has been completed, with sewage irrigation added; and main sewerage plans are being prepared for other continental cities. At Warsaw, with a population of 350,000, the estimate for sewers is £600,000. Buda Pesth, population 270,000, main sewering under consideration. St. Petersburg, population 670,000, estimate for sewers £3,000,000, to include pumping and sewage purification. Munich, population 250,000, estimate for sewering £600,000. Dusseldorf is to be sewered by Messrs. Lindley, of Frankfort. Messrs. Lindley have sewered Frankfort-on-the-Maine, population 125,000, cost £380,000. Out of 6,800 houses, 5,200 have been completely drained, and in the town there are about 22,000 water-closets. At present, the sewage goes into the river Maine, but it is to be intercepted and clarified. The Prussian Government insists on sewage clarification, which, at present, is stopping sewering on the Rhine cities, where it is very much needed. The water of the Rhine is, however, used for domestic purposes by the population on its banks, and it ought, therefore, to be preserved free from sewage. French and Belgian towns remain with cesspools; even Paris and Brussels, with their enormous and costly main intercepting sewers, are cities of cesspools; and I do not know of a single well-drained city in Italy.

THE SEWER PIPE AND THE WASTE WATER MAIN.

Dr. RICHARDSON said he wanted the Meeting to consider whether in towns where there were sewers at present, and storm water and sewage water mixed together in them, a small sewage pipe could not be carried along inside the present sewers, and thus kept separate from the storm water. Could a small sewage pipe be carried through the existing London sewers, for instance, which might then be reserved entirely for storm water.—The PRESIDENT said this would have been quite possible before the sewers were so built over. London was sewered, and all the eloquence of an archangel would do nothing towards effecting an improvement. Belgravia, its most fashionable centre, was, in spite of the expenditure upon it, the foulest portion of London. The sewers contained deposits, and were charged with sewer gas. In the Government buildings at Whitehall visitors could smell the gas as they proceeded along the passages to his office. He had been frequently admonished to put his own house in order, but had been unable. The basement of Somerset House was in a worse condition than his own offices, and if he had to change offices and go there he would prefer throwing up his appointment. As for the drainage of the War Office, it was worse than that of any low lodging-house.

THE SEWERAGE OF MEMPHIS.

This is the title of an elaborate paper by Mr. G. E. WARING, jun., of Newport, Rhode Island, and read by Mr. ROGERS FIELD; on important sewerage works in the United States. Memphis is a city of about 40,000 inhabitants, situated on the east bank of the Mississippi River, about midway between St. Louis and New Orleans. Its area, including its immediate occupied suburbs, is about four square miles. Of this about one square mile is the more strictly urban, being quite closely built over, a considerable portion in compact blocks, and the remainder with semi-detached houses. Many streets of this part of the town were covered, ten or twelve years ago, with wood pavement, which, during the past four or five years, has fallen into very bad repair, and most of which is now being removed, its place being supplied by stone block pavement or macadam. The Mississippi River has an extreme variation of level of about 35 feet. At least once during the year, and often two or three times, it fluctuates to the extent of from 20 to 26 feet. Extreme high water is reached, or nearly approached, almost yearly; but it is seldom that the subsidence goes to within several feet of extreme low water mark. The city was founded less than fifty years ago, and its growth, due to a most advantageous position in the heart of one of the best cotton-growing regions of the country, and on the great highway of western commerce, has been constantly interrupted by epidemics of various diseases, some of which have been so violent as to threaten the depopulation of the town. In 1878 there were over 5,000 deaths from yellow fever between August 14th and November 3rd, and on one single day the small heroic remainder of the Volunteer Relief Committee had 300 unburied bodies on their hands. The whole city, under, as well as upon the surface, was reeking with organic filth. The situation offered a rare opportunity for sanitary work. In 1868 a careful survey of the city was made, and skilful engineers were employed for the preparation of a plan of sewers. This plan was the usual one of large storm-water sewers, varying in size from a 12-inch pipe to a 7-foot outlet main. The main sewers and the main branches, which alone were provided for in the plan, would probably have cost, under present prices, 600,000 dols. The extension of the laterals to accommodate the whole city would have added very greatly to this. During the epidemic of 1879 this plan was revived, and estimates, varying from 1,000,000 to 2,000,000 dols., were based upon it. It was evident to the Commission that such an expenditure would be found

impracticable, and it became necessary to devise a cheaper plan for cleansing the town. Mr. Waring had had experience in the case of several small villages which indicated the feasibility of securing the desired result by the use of sewers of very small size, graduated to the single duty of removing household and manufacturing wastes. It was determined to recommend this system as a substitute for the more costly one. The recommendation was accepted. It was all important to complete the sewerage of the thickly-settled part of the town by the end of May last, the turning up of the soil in such a climate in hot weather being extremely hazardous. The sewage of the closely-built part of the city was practically completed by June 1st. While there are yet many houses depending on their earth closets, the use of the sewers has become sufficiently general to prove their entire adequacy for the work for which they were intended. The gradients in Memphis are quite generally very good; so much so that it was considered safe, even in the most thickly settled parts of the city, to continue to use sewers of a diameter of 6 inches for a length of 3,000 feet (including the lateral branches). There were, therefore, very few cases where it was necessary to make lateral sewers of a larger size, though in a few instances they were increased to 8 inches. The two separate systems whose mains come together begin with a 15-inch pipe for the west side of the bayou (or river side), and a 12-inch pipe for the east side. The 15-inch main on the west side is continued as far as the junction of Hernando and Beale Streets; from this point there is a 12-inch pipe as far as Vance-street. All tributaries are either 8 inches or 6 inches in diameter. On the east side the 12-inch main goes as far as Union Street, whence its extension to Vance Street, with a view to future work towards the south, is of 10-inch pipe. The rest of this system is of 8-inch, 6-inch, 12-inch, and 15-inch pipes. The outlet is by a 20-inch brick sewer, continued with 20-inch pipe, discharging into Wolf river below low water-mark. This outlet is to be used, after the work is completed, only during high stages of the river. The low water main, which will be of brick, will be continued thence by a 20-inch iron pipe with leaden joints to below low water of the Mississippi. The object aimed at is simply to secure the complete and speedy removal of all foul sewage through pipes absolutely tight as to their joints; true as to gradients, and laid on generous curves; to secure the most complete ventilation possible; to cause the least possible disturbance of the flow at the numerous inlets; and to give every pipe an effective daily flushing. A new form of house connection or branch piece was adopted. The most striking departure from ordinary custom and prescription is the entire absence of man-holes and lamp-holes, and the utter disregard of the alignment of the sewer, so far as the question of examination or cleansing is concerned. Mr. Waring trusts to the open inlets for ventilation, and to daily or half-daily flushing for cleansing. Should a sewer at any time become obstructed, the obstruction would manifest itself at the lowest house connection above the point of stoppage, and the stoppage would have to be removed by digging down and opening the sewer itself. This would, of course, cost more than to withdraw the obstructing substance at a man-hole; but no single instance of stoppage has yet occurred, and he is confident that the interest on the cost of man-holes and lamp-holes would be enormously greater than that of the occasional openings that may become necessary. These sewers have no projections or rough points to collect foreign substances; nothing can get into them except through pipes of materially smaller diameter than their own; and each sewer, with its branches, is swept from end to end at least daily, by a large volume of water, rapidly discharged from a Field's flush-tank. There are now about 120 of these flush-tanks in constant operation, and when the work is completed the number will be increased to over 150. The discharging capacity of each tank is over 100 gallons. The ordinance concerning private works, connections, flushing, etc., will, it is believed, render it impossible for foul matters to lodge in any part of the house drainage or sewerage system. The subsoil drains do not deliver into the sewers, but find their outlet directly into the bayou and its branches. The authorities of the city are already ascribing their present unprecedented low death-rate and almost entire immunity from malarial diseases to the execution of these works. Mr. Waring describes them partly as a matter of information concerning an important American work, and partly to indicate the degree to which Mr. Rawlinson's original recommendations in favour of the use of small pipe sewers has been accepted by his Transatlantic followers.

The PRESIDENT said that they were much obliged for the paper sent by Mr. Waring. Sanitary works, if they were to extend, must be cheap. Reports were written in 1843, by Mr. Chadwick, in which the principle advocated was laid down, and sewers of small diameter recommended. In 1849 Alnwick was drained on this principle, and no one had complained of the drains. After 1848 this mode of drainage was taken up and discussed by the opponents of the system with great virulence. He must confess that he never trembled in the presence of man in his life until he stood up in the meeting of the sanitary engineers, knowing that he was alone to face the persecution of small drains and small sewers proposed by Mr. Chadwick, and from that meeting a resolution went forth which led to the adoption of the large sewers like those in Paris and other cities. But Paris, with all its large sewers, was not a sewered city. In this plan different principles were brought to bear. The engineer knew that he could not deal with the tropical rains that fell. If an engineer went into a city and made a rule-of-three sum as to what should be done to take away the rainfall, he made an egregious mistake. The surface water should not go into the sewers, but flow over the surface. There was one thing in the paper that he did not agree with, and that was the absence of man-holes. He thought it would be found that there must be man-holes, as there would be sure to be chokages at some time, and with man-holes there would be no necessity to break up the road to find the spot. He was a member of the Army Sanitary Committee, and as they knew, great works were contemplated in India, and the chief thing he had to compete with here was the desire of engineers to make enormous sewers to meet the rainfall. The rainfall in India at times was thirty inches in twenty-four hours, and how was an engineer to provide for that? If he made railway tunnels for drains he could not get the fall in. The rainfall must be allowed to flow over the surface. If this caused injury to the surface they must adopt means to repair the injury, but for goodness sake do not let them make enormous sewers which, in dry seasons, would be areas for evaporation. He had not succeeded in getting his advice followed in some large towns, but in Bombay they had decided to discard the tropical rains from the drains and provide surface drains, and he, therefore, hoped soon to

see Bombay an example to other cities. They were told by some engineers that sewers should be large enough for a man to get into to clean them out. All he could say was, that the Legislature had passed a law to prevent boys going up chimneys, and he hoped a law would be passed to prevent men from going into sewers to clean them out. He mentioned instances of places sewered on the principle laid down in the paper with marked success.—Mr. CHADWICK said that Mr. Waring had just been consulted on the sewerage of Washington on the same principle as Memphis. If that was undertaken it would be a lesson for the Metropolis and other large cities, both here and in Europe.—Mr. LEMON, C.E. (Southampton), pointed out that under existing regulations it was necessary that plans of drainage should be submitted to the local authorities, who had ample powers, though they were too often reluctant to put them in force owing to the pressure put upon them from outside in all directions. He was also of opinion that no system was perfect which dispensed with man-holes.—Dr. MACLAGAN, as a Medical Officer of Health, corroborated Mr. Lemon's statement as to plans of drainage having to be approved by the local authorities.—Colonel JONES pointed out that the system used in Memphis was advocated so far back as 1847 by Mr. Chadwick.—Dr. CARPENTER took exception to the way in which the sewage was disposed of. He endorsed the principle laid down —'The rainfall to the river and the sewage to the soil.' Great Britain could not afford to lose the sewage, and if it were cast into the sea it must eventually end in bankruptcy. He believed that we could get three times the produce from the land if the sewage were properly utilised, yet it was thrown away because they could see no benefit to themselves from applying it to the land. He did not think that the towns would ever benefit, but in his opinion it was the person who put it on his land that should get the profit.—Mr. W. WHITE said he believed that at Memphis it was necessary to get rid of the sewage effectually and at once, and that could not have been done if they had not looked about for means of utilising it.—Mr. TOWLE (Oxford) advocated the distribution of sewage over the land, and he maintained that it could be pumped to any height. The whole country should be one immense sewage farm. A vote of thanks was accorded to Mr. Waring for sending the paper.

Major-General SCOTT, C.B., F.R.S., read the following

SUGGESTIONS FOR THE CLEANSING OF SEWERS.

The water-carriage system, with its many and great advantages, exposes a community employing it to serious dangers. These arise, in most cases from preventable causes; but as ignorance, apathy, and the scamping of work cannot be completely eradicated from human beings, it behoves those who may suffer from the consequences of these short-comings to take all possible precautions against them. If the sewage of a town could at once and completely be removed from the neighbourhood, and be taken to a point sufficiently distant, its inhabitants might escape harmless, whatever might be the annoyance to its neighbours between them and the sea, but this is not often the case.

Too often 'each drain acts' (as was stated in the First Report of the Commissioners for Improving the Health of Towns 'like the neck of a large retort, and serves to introduce into the houses the subtle gas which spreads disease from the accumulation in the sewers'. The well-directed labours of Mr. Rogers Field, Mr. Griffith, and others are effecting much to prevent this in the houses of the wealthy, but without special administrative arrangements no relief will be given to the classes who cannot afford to employ a skilful engineer, and, indeed, cannot perceive the paramount importance of doing so. The expedients which can be adopted to remedy the evils arising from the adhesive nature of sewage matters and from the deposition in flat drains, or arising from an insufficient quantity of water, are first, to break up the slimy, glutinous condition of the sewage as soon as possible; secondly, to absorb the gases which arise from the decomposition of the sewage, and which, by the increased pressure which they exert, force sewage gas into our streets and houses; and thirdly, to flush the sewers copiously. The two first objects can be attained by introducing lime into the sewers at their summit levels. The gases which chiefly result from the decomposition of the organic matters of the sewage are carbonic acid and sulphuretted hydrogen, the first being evolved in by far the largest quantity. When lime is introduced into sewage-water, the carbonic acid is removed from solution, and can no longer add to the pressure of the air in the sewers. The sulphuretted hydrogen is also for the time rendered comparatively inoffensive, being converted into sulphide of calcium. At the same time the glutinous nature of the sewage is destroyed by the coagulation produced, and then, with a degree of flushing, proportional to the flatness of the sewers, all deposits can be readily removed. The sewage no longer acts as a cement to bind together the particles of detritus washed from the roads.

In the year 1872, I had the opportunity of carrying out an experiment at Ealing, which I find described in an old paper of mine in the following words:—'In lieu of introducing the precipitating materials at the outfall, as hitherto practised, they have been introduced into the sewer itself at a point nearly one and a half miles from the depositing tank, and near the head of the village . . . and the experiment was attended with the happiest results. All the slimy and sticky black decomposing filth which usually furs the bottom and sides of drains disappeared; the main sewer was perfectly freed from stinking sewer gases, no deposit of any sort was left behind, and, owing to the thorough admixture of the chemicals with the sewage, the deodorisation and precipitation were more perfect than when the precipitants were introduced at the outfall. As the main sewer alone was treated, and the branch drains to the side streets and houses were comparatively unaffected, still, inasmuch as the great volume of the sewer gases was disposed of, much benefit resulted.' The Surveyor of Ealing, Mr. Charles Jones, visited a portion of the sewers, and found the results above described; and so much impressed is Mr. Jones with the value of the cleansing effect of the lime on the sewers, and of having the liming operation under his own eye, that he has prepared a chamber within the premises of the Local Board from which the lime can be introduced at the head of the main sewer. It may be objected, perhaps, that the action of the lime would also be to set free the ammonia, and as this is a great carrier of noxious vapours, a counterbalancing evil to the advantages named might be reckoned upon; but I submit that the quantity of ammoniacal salts existing in the sewage is too minute to allow appreciable volumes to escape from the liquid, more especially as I would propose to add the lime at the moment when the flushings take place, and

so contrive the flushings, by means of the sewage water itself, that they may take place at short intervals of time. In so far as the solid organic matter is concerned, as long as any free lime is mingled with it, putrefactive decomposition does not go on, and when the lime becomes carbonated, it loses the property of expelling ammonia from liquids. By the use of salts of iron with the lime the sulphuretted hydrogen may be permanently, instead of temporarily, fixed, but the cost of the process is increased. Lime is recommended on account of its small cost, but many other precipitants will serve the purpose. These, then, are the means which I would suggest for deodorising the sewage, for reducing the tendency of the gases formed from it to escape into our streets and houses, and to enable the deposit to be washed from the bottom and sides of the sewers with facility.

For flushing purposes I would suggest the use of Mr. Rogers Field's Flush Tank, exhibited by Messrs. Bowes Scott and Read, at the Exhibition now being held at Exeter. It allows of the sewage itself being employed to work it, so that the process of washing out the sewers can be effected without material cost. It also admits of the use of power obtained from the falling water from the tank to discharge from a hopper the required doses of quick-lime. Of course, when lime is applied at the summit levels of the different branches of a sewerage system, precipitation at the outfall tanks may be dispensed with.

COLONEL ALFRED E. JONES read a paper on

SEWAGE,

of which the following is an abstract:—In former days, when population was less dense, and before a regular water-supply had been introduced, towns depended upon wells and rain-water butts, cesspools and drains satisfied the requirements of the inhabitants for the storage and removal of foul liquids, as well as surface and subsoil water; but when once a regular water-supply introduced water-closets and a generally increased consumption of water in a town, there arose an imperious demand for better sewerage or drainage.

Engineers who had scientifically planned and constructed a water-supply system, with pipes carefully graduated to meet the wants of every street and house, seem to have exhausted all their science and energy in the effort to provide the water, and when called upon to secure its removal after it had been fouled by use in the town, they could think of nothing better than to let it soak away into subsoil, or run downhill in old or new drains together with the rain-water. When this need of sewerage was first recognised, it was thought that settlement in a tank before discharge into the nearest natural water-course was all that was necessary, and accordingly the sewerage system was contrived to bring everything—sewage, rainfall, and all—to some low-level tank outside the town, and as close as possible to the natural water-course.

Nor is this loss of value the only bad result of such a want of system, for in a sanitary point of view the large sewer must in dry weather generally become a gas-generating cesspool, instead of the self-cleansing conduit always contended for by Mr. Chadwick, Mr. Rawlinson, and the other prime movers in the demand for better sewerage from the year 1848 up to the present time. They pointed out the need of such self-cleansing sewers, but the executive engineers thought that the rain-water of our humid climate would cover any want of calculation and consideration, which it was inconvenient to them to apply to their work, so they made every sewer as large as they could and trusted to Providence.

At a meeting of the Society of Arts in the year 1876, I referred to this arrest of scientific treatment at the point when water issues from the supply pipes, and the idea was taken up and has been fully and satisfactorily worked out by Mr. Isaac Shone, a mining and civil engineer of Wrexham, who read a Paper at the Annual Congress of this institution at Leamington in 1878. I then remarked that, probably in future years, that meeting would be especially noted for its introduction of the sewerage system of the future, and after two years' observation and experience of its excellence, I agree with the following quotation from a letter lately received from Mr. J. J. Mechi of Tiptree Hall, Essex, who says: 'Nothing can change my conviction of the practical utility of Mr. Shone's admirable and simple invention, and I feel sure that, ultimately, it must be generally adopted.' The system in question has been before the world for two years, and met only with praise from those who have studied it, and among that number not an objection has been made which could not be readily answered. I will not weary the meeting by entering into details which are to be found in numerous circulars and pamphlets supplied by Mr. Shone, but should like to state that I am fully satisfied with the trial which has been made at my farm during the last year-and-half, not, be it understood, for any purpose or advantage of mine in irrigating the land, but simply as an exhibition to numerous visitors of the inventor's method of lifting liquid from a low to a high level by the power of a steam engine or water power at long distances from the point at which the lift is required. Now, every engineer who has ever planned the sewerage of a town must recognise the advantage accruing from the facility of giving good falls to his collecting sewers towards certain man-holes under the streets, wherein, by a simple automatic apparatus, their contents can be made to mount with unerring certainty some 10, 20, 50, or 100 feet, and then begin their gravitating course towards the outfall, or be pushed on by the same power along a level or rising main in any required direction. Formerly such a plan would have required a regular pump and motor with attendance on the spot, the expense and inconvenience of which, led the engineer to make such lifting-stations only on a large scale, and as quite exceptional aids to gravity. He was thus tempted to be content with flatter gradients than it was desirable or safe to adopt; but as there is no reason why Shone ejectors cannot be placed out of sight under any street or square without interference with traffic, and actuated by power generated by steam or water at any convenient place several miles distant, if necessary, from the several ejectors, the engineer is now free to choose the most favourable localities towards which, as centres, he can give an artificial fall for the collecting sewers of each district where a natural one is not available. Plans and estimates have been prepared for the sewerage of several towns on this system, which show very considerable economy as compared with the unscientific system of the past, so there is no objection on that score to detract from the weight of the sanitary argument for its universal adoption, and I have no doubt that an absolute revenue will be gained by the delivery of sewage proper to the land in a more marketable condition than it has yet been offered to the farmer.

Passing from the pneumatic ejector above referred to, I will introduce to your notice another valuable improvement combining the most perfect sewer gas-

trap with automatic flushing for house-drain or public sewer, which we owe to the same inventor, who, recognising its analogy with his pneumatic ejector, has called it the hydraulic ejector. Both the pneumatic and the hydraulic ejectors are intermittent in action, collecting and storing for a few seconds, or a longer period of time, whatever sewage is led into them, and ejecting their contents automatically, and with perfect certainty, the moment they become full. The only limit of height to which the *pneumatic* ejector can project its contents is the air-pressure, which it is economical to apply; but the *hydraulic* ejector, as its name implies, is limited by the total fall or head of sewage, and of course it is not pretended that it will do more than discharge in one gush, what would, if it had been clean water, have flowed down a pipe which had the same fall distributed evenly over its whole length. With dirty water or sewage, however, the advantage of storing up and discharging in gushes by syphon action has long been recognised and applied by Mr. Rogers Field, C.E., in his well-known flush tanks. In circulars describing the original flush-tank of this inventor, its two defects were very candidly intimated by the recommendations (1) to throw a jug of water in suddenly to start the syphon action, if the tank at any time failed to discharge itself automatically; and (2) to remove the cover and clean out sediment from the tank occasionally. Servants and others are not always very attentive to the directions of those interested in the regular working of any contrivance; and I think Mr. Shone has taken the very simplest and most practical means for dispensing with the necessity for issuing any directions for insuring the perfect working of his *hydraulic* ejector, by pivoting over it a tumbling-box or basin, which, when filled by a small pipe—say from a sink or any other convenient source—will automatically topple over and right itself. It is thus evident that when the tank has been filled by the other discharges of the house or the sewers led into it, the next succeeding overturn of the basin must inevitably start the syphon action, which will empty the tank as effectually as Mr. Rogers Field's jug of water poured in by hand. The second precaution suggested by Mr. Rogers Field has been obviated in an equally simple manner by starting the syphon from the very bottom of the tank which shelves down to that point; so that any sediment accumulating there is subjected to the full force of the discharge, and must go out in front of the lighter contents of the tank. Mr. J. C. Edwards, of Ruabon, manufactures these ejectors in the simplest possible manner by making a fire-clay bottom and cover to fit one of the ordinary 2′ sanitary pipes, set vertically to form the body of the tank, the syphon being composed of ordinary 4″ sanitary pipes, cemented together as usual. Mr. Rogers Field has introduced a very ingenious improvement upon his old form of tank, to which allusion has been made above. This is called the annular syphon, and doubtless works well with clean water or *screened* sewage in tanks of large dimensions; but, owing to the cubic space occupied by this annular syphon, which must necessarily be deducted from the total internal measurement of the tank, as rendered non-effective for flushing purposes, it cannot, he thinks, be so economically applied on a small scale; and it is highly probable that the rags and miscellaneous articles always found in *unscreened* sewage, would lodge on the sharp edges presented to the outflow of the sewage, even if the annular space were as favourable for that purpose as the simple pipe usually employed.

Dr. DOMENICHETTI read some notes on

THE WATER-SUPPLY OF THE LOUTH RURAL DISTRICT,

in which he said: Louth Rural Sanitary District comprises eighty-nine parishes, somewhat unequally divided by the 'Wolds', those on the east lying in proximity to the sea, the country being flat, and the soil, for the most part, a rich loam, of the drift and post-tertiary formations, overlying a clay subsoil.

On the west the country is hilly, dipping occasionally, with loose soil covering the upper and lower greensand formations, overlapping the calcareous strata in connection with the 'Wolds'.

As in most chalk formations, the water-supply is ample; but boring to the depth of 100 yards in some localities is ineffectual in procuring water, whereas in most of the marsh villages overflowing springs and 'blow-wells' abound. This latter designation is applied to springs where the water flows to a considerable height, owing to the pressure exercised by the water-bearing strata in the hills.

Having thus given a general outline of the sources of water-supply, I propose to describe the distribution of it as regards meeting the wants of the population; and, before doing so, I must observe that no water can be considered reliable which is not obtained from a rock source. In many villages near the coast, such wells are scarce, as the surface water obtained from the gravel overlying the clay is much more accessible, but of course objectionable, being liable to pollution.

In approaching the coast, the difficulty of reaching the underlying rock is, of course, increased, and it is only in certain districts that deep boring is attended with success, especially at Mablethorpe, where the water is generally brackish; and it has been a source of anxiety to meet the wants of this favourite seaside resort. All the springs are affected by the tide; and an analysis of a sample of water from this place by Professor De Chaumont, F.R.S., indicated 92 grains of solid matter per gallon, while the hardness showed 59 degrees of Clark's scale. These facts are doubtless discouraging; yet an enterprising proprietor, at the suggestion of Professor Frankland, has adopted the softening process, by means of quicklime, with very good results, and, after filtration, he has succeeded in producing a wholesome and potable water. This, however, is an individual case; but the problem of supplying the inhabitants generally is not yet solved, and should the place become populous, some other plan must be devised.

The town of Louth, containing 10,750 inhabitants, is mainly supplied by a company, which have utilised the 'Silver Spring' lying adjacent in the Wold Hills, though many houses have wells on the premises more or less impure; but many of the latter class have been improved of late years, and the zymotic death-rate of Louth for 1879 was 1.9 per 1,000, which speaks well for the general salubrity of the town. The rural district death-rate for the same period was 1.29 per 1000. Preventable disease has not been rife. Typhoid fever scarcely exists in our midst; and out of a population of 24,750 only one death occurred from it in 1879. The autumnal diarrhœa contributed the largest number of deaths under the zymotic class, and did not appear to be influenced by the water-supply. These results have been mainly brought about by close attention to the wells of the district

under the powers given by the recent Act of Parliament, and many new ones have been sunk.

In some of the large farmsteads, rams have been constructed; and in others, where well-boring was impracticable or difficult, brick tanks, cemented inside, have been constructed, to hold 1,500 gallons, at a cost of £20, to supply double cottages. Iron tanks are in use, but not generally approved of. Believing as I do, that a wholesome water-supply is the great factor in promoting the public health, I have offered these remarks in the hope that attention may be drawn to a district purely agricultural, where much has been acheived, even in these depressed times, by a vigilant attention to the water-supply, without embarking in any ambitious schemes, and relying solely upon the proprietors giving a loyal support to the intentions of the Legislature, under the guidance of the sanitary authorities; for we have to look for improvement in sanitation, not only to the co-operation of capital and labour in the initiation of schemes for an improved water-supply, but also to the patient investigation of the evils which lurk in many a domestic household, and only to be removed by the exercise of the powers we possess for their mitigation and removal. In conclusion, let me review some of the suggestions which have been put forward on this topic, and consider which are applicable to the district which I represent. It has been proposed to supply villages by pipes from distant sources—say the Wold Hills in this district. This plan is clearly too expensive, and must be dismissed, except perhaps in the instance of Mablethorpe, on the coast, and the villages intervening between it and the proposed source, ten miles distant. The river-catchment system, as advocated by the Royal Commission in 1869, by which each should supply, as far as possible, its own population, is inapplicable here, except in a limited form, owing to the pollution of the principal streams by sewage. Artesian wells might be resorted to with advantage, superseding gradually the surface-water too frequently in use; and, lastly, the utilization of the rainfall for individual houses and farmsteads. It would be foreign to my purpose to dwell upon the system of main drains and dykes, under the supervision of the Commissioners of Sewers, for watering cattle, etc., as this source is condemned by sanitarians as impure for domestic use. My object in bringing forward this subject will have been attained if I am able to elicit any suggestions for the improvement of the water-supply of my district.

Mr. WM. WHITE, F.S.A., read a paper on

WATER-CLOSET CONSTRUCTION,

in which he gave several practical suggestions. He deprecated the use of all closets by which, on the pulling up of a handle, the contents are dropped down by means of the withdrawal of a plug, valve, or pan, whether into a trap, or directly into the soil-pipe and drain itself. Apart from valves and plugs being liable to derangement, it was evidently possible, and in many instances of accidental deficiency of water extremely probable, that they might be used without water, to the great danger of corroding the pipes and choking the drains. Secondly, he eschewed everything but some description of hopper-basin or flushing-pan, the contents of which would not be let down, to the danger of soil-pipes and drains, and from which, in case of the water service failing, a pail of water poured down would carry everything away safely. He recommended having the best possible flush of water which can be obtained by a regulator, or waste preventer, constructed without any valve, except only the ball-valve which supplies the 'feed' or serving cistern. He would in all cases insist upon the use of this feed cistern, or other intermediate receptacle, for cutting off completely all contact between the closet and the main service, or house cistern, and would avoid all traps except the one formed in the construction of the hopper-basin; this being made to flow out into a ventilated or open soil-pipe, which again might be carried up within an external ventilated flue for protection from frost, or for carrying off the foul air more effectually. He recommended the 'Shrewsbury' patent basin, made by F. Pierce and Co., and Hailstone's patent, and Braithwaite's patent.—The PRESIDENT laid stress upon water-closets having no connection with the water-supply. He spoke highly of ordinary soil-pans flooded with water from the sink.

Mr. BOULNOIS, the Exeter Borough Surveyor, read a paper, illustrated by diagrams, on

THE ANNIHILATION OF SEWAGE GAS.

Mr. Boulnois' proposal was to prevent any sewer gas escaping into the streets, by an arrangement which, he said, would absorb the gas into earth, and there be rendered harmless in nature's own laboratory.—The PRESIDENT said he was sorry he could not encourage Mr. Boulnois to follow up his idea. He (Mr. Rawlinson) would never advise its adoption. His object had always been to ventilate sewers in the simplest possible way. Where there was any bad smell in a sewer it was not because it was ventilated, but because it was not ventilated sufficiently. The Surveyor of Leeds, one of the best of Local Surveyors, had opened 20,000 gullies in that town, and had resulted in improved health. It might be in some cases offensive to let sewer gas come into the street, but it was infinitely better there than in the dwellings. There was no capacity in Mr. Boulnois' system of stones and earth for the absorption he spoke of. As to the ventilation of sewers by furnaces, Mr. Rawlinson said that only affected the sewer to a small extent, and engineers who had contemplated furnaces had abandoned them.—Mr. W. J. SQUARE (Plymouth) said almost all old towns had large sewers. Very few had small tubes for sewage, and he believed it would be of great advantage in those towns if all the street gullies were untrapped. By that means they would lessen the large expense incurred for a large number of gratings. In Plymouth, during the dry weather of the last six or eight weeks the gullies were untrapped throughout the town, and the town was remarkably free from zymotic disease during that time, and he had scarcely heard anyone complain of anything like smells from sewer gas. That shewed that if there was a large quantity of air entering into the sewer the smell was scarcely to be perceived, and it would be a cheap plan in old towns of diminishing the cost of ventilation if street gullies were allowed to be untrapped.—Mr. BOULNOIS, in his reply, said it was not necessary that air should be forced into his arrangement of earth, etc., but it would be absorbed naturally.

ON THE VENTILATION OF WATER-MAINS.

Mr. F. C. STEPHENSON, M.B., read a paper on the above subject. He presumed that it would be conceded that, given a certain collection of good water in a tank or reservoir, it was equally pure, whether it was discharged into a constant service system or an intermittent one, and also that the dangers inherent in an intermittent water-supply had so far nothing to do with the water itself, only with the system, thanks to

the imperfect details which were still permitted to be carried out and the rival results of former faulty systems. The question was how to obviate these dangers if possible. The great danger of the intermittent system arose from the tendency of the system, where the supply was turned off, to produce in the water-mains and service-pipes a vacuum, the result being that they became rapidly filled by suction power, or rather the external pressure with a leakage of air and soakings from more or less impure sources. Were the mains and service-pipes and taps all good and efficient this leakage would not be so dangerous, but unfortunately they were not. As it was, the risk was the absorption of foul gases into the water, rendering it a suitable fluid for the production of diarrhœa, enteritis, or fever. He would propose to combat this great danger of intermittent systems by ventilating the mains from above, and by introducing a V-shaped pipe as an anti-suction valve at the junction with every house-pipe or other outlet. He would propose, at a point immediately below the cut-off cock, to introduce a ventilating pipe, which could be led up the side of a house, or be fixed to a post at such an height and in such a position as to admit pure atmospheric air. While the ventilating pipe at the head of the main would admit a free supply of fresh air to the system, the V pipes being full of water would prevent the admission of any air or gas from houses or closets, or any other outlet of the water-system. The ventilating pipe without the V pipes would not suffice, for when the water had run out the system was filled with air, the temperature of the dwellings and underground being greater than that of the outer atmosphere, there would soon be a backward current of air established, with the consequent risk of the inhalation of impure gases. A constant water-supply was necessarily vetoed on account of the expense, so it remained for science to help 'the powers that be' out of the difficulties which finance imposed upon them.

Mr. BOULNOIS said he had listened with great interest to the paper. In the present intermittent system that prevailed, on account of the cost of a continuous one, it was frequently necessary to empty the mains as described, and no doubt foul air entered them. He considered the V pipe or syphon a good idea, but with regard to the elaborate process for ventilation, he thought it could be dealt with by means of ball-hydrants.

Mr. STEPHENS in answer to a question, said that he proposed to put the V syphons in every house, otherwise people would not do right.

On the fourth day of the Congress, the President of the Section read an address, of which the following is an abstract.

SIR ANTONIO BRADY'S ADDRESS.

METEOROLOGY.

The importance of ozone in the economy of nature has only quite recently been ascertained and appreciated. During the thirty years which have elapsed since the famous researches of Schönbein, ozone has been studied by some of the most illustrious scientific men of the century. The most recent work on the subject which has come under my notice is by Dr. C. B. Fox, of Edinburgh, and it contains a *résumé* of all that was known up to the date of its publication in 1873. Schönbein, in his work on the action of oxygen (the life-giving principle in the air), expressed his opinion that the blood globules, like phosphorus, are endued with the property of chemically polarising the oxygen of the air with which they are brought in contact in the lungs, and of thus splitting it up into ozone and anti-ozone. I must not, however, quote further, but refer my hearers for full particulars to the many learned treatises on the subject, which treat of the abstract principles of experimental chemistry. All I can add about it here is, that it is believed to be the chief oxidising principle of the air we breathe, and is one of the chief agents by which the many impurities contracted by air and water are removed altogether, or changed into harmless oxides. The legislature has passed Acts for the purification of the atmosphere of smoke and noxious vapours, but has not taken measures for putting these Sanitary Acts in force. Nature is more beneficent, and by the aid of winds does much to remedy the pollutions made by man by diluting them by ventilation on a grand scale; and we ought to see that no impediment is laid in their way. Bad food, and especially diseased animal food, as well as unripe or decaying fruit, is the cause of many serious illnesses, which our physicians find it difficult and often impossible to grapple with. Too great severity cannot be dealt upon those villains who knowingly sell diseased meat, poultry, or fish. The immunity of the Jews from scrofula is a great fact. They are forbidden by the law to eat the foul animal. The pig *(sus scrofa)* is the principal—nearly the only—animal food of the inhabitants of the Western prairies. Scrofula (from *sus scrofa*), I learned when in America was the cause of much suffering from that sad disease. It is first cousin to consumption, which is awfully fatal in the United States. The following extract from the *Ecclesiastical Review* of July 31st, 1880, fully bears out the above experience, and is a very remarkable testimony in favour of carefully-selected animal food, it being well-known that the chosen people only eat food killed by persons appointed for the purpose, after careful examination, and that any beast discovered to be in any way unhealthy, or found to be in any way defective, is discarded, or sold again in the open market: 'What he (Dr. Thring) states as to the survival of Abraham's children is very interesting, and fully borne out by vital statistics as well as by Scripture prophecies. A Jew's life (he says) is found on an average to be worth fifty-seven years in duration, whilst a Christian's in the same country is only worth twenty-seven, or less than half as much. Dr. Septimus Gibbon, speaking at the Pathological Society of London, in 1876, said: "The Hebrews of the Metropolis are notoriously exempt from scrofulous and tubercular taint. During the last twenty-five years I have attended a large number of Hebrews, both as hospital and private patients, and have never met with a single case of pulmonary consumption amongst them; and a former colleague at the London Hospital, who had a large *clientèle* amongst this favoured people, told me that for forty years he had only met with two cases. The Medical Officer of one of their large schools has remarked that their children do not die in anything like the ratio of Gentile children; and in the district of Whitechapel the Medical Officer of Health has reported that on the north side of the High Street, occupied by Jews, the average death-rate is 20 per 1,000 inhabitants, whilst on the south side, occupied by English and Irish, it is 43 per 1,000." (*Transactions of the Pathological Society*, vol. xxvii, p. 437.)'

Mr. G. J. SYMONS, F.R.S., President of the Meteorological Society, read a paper on

Some Deficiencies in our Knowledge Respecting Health Resorts.

He said:—It is obviously of increasing importance that the localities to which we temporarily migrate in the autumn should be as healthy as they can be made.

And here it may be well to remark that the visitors are better judges of what is healthy than the residents. Those who spend the whole twelvemonth on a bracing mountain slope cannot realise that it matters whether the bedroom windows open at the top or not; and, as sleeping in a close room does not affect them, they set any remonstrance down as a whim of their visitors, forgetting that it is the constant breathing of a pure atmosphere during the day and all through the year which enables them to sleep in a used-up atmosphere with impunity—and equally forgetting that it is largely for the sake of pure air that their visitors come, that where they get most pure air they will derive most benefit, and will therefore be most likely to return.

I have quoted only one feature—windows; but need hardly say that identical reasoning applies to cleanliness in every respect—to purity of water, to the quality and cooking of food, and, indeed, to all the ministrations of life.

It would be of immense benefit to the medical profession and the public at large, to know with truth and absolute impartiality the relative climates of our various health resorts, but at present very little is known.* There are a host of local treatises, but they are mostly advocates of the place whence they take their title. We have also some general treatises on the subject, but they are necessarily based on the returns made by persons interested in the popularity of the places in which they reside, and most of them have placed their instruments as well as they know how, but the result is diverse indeed. How then, can the indications of their instruments be comparable? Moreover, there have been cases strongly indicating a desire to 'make things pleasant,' by slight departures from impartiality in recording the observations, and hence (unjustly) there is a wide-spread want of confidence in returns from fashionable health resorts. This should not be. Might it not be removed by the local authorities at each appropriating a small portion of open space to the erection of a set of meteorological instruments, properly verified and properly mounted, and having them regularly recorded by one or more persons? Let the book of observations be always open to public inspection, let whoever takes the observations add his initials, and let the instruments be always readily accessible on application. This proposal might cost each town £10 or so, not more, and it would soon confirm the accuracy of most of those, on all of whom the records of *some* have cast suspicion.

Take the coast from the Thames to the Land's End. We find the following sea-bathing places without any records being sent to the Society respecting their temperature or humidity:—Herne Bay, Westgate, Margate, Broadstairs, Deal, Dover, Folkestone, Sandgate, Hythe, Hastings, St. Leonards, Seaford, Brighton, Littlehampton, Bognor, Ryde, Sandown, Shanklin, Freshwater, Weymouth, Charmouth, Lyme Regis, Axmouth, Seaton, Exmouth, Dawlish, Looe, and Penzance. Twenty-eight places on the South Coast alone, each doubtless possessing features different from every other, slight, probably, in some cases, as, for example, Littlehampton and Bognor, but extremely marked in others, as for instance, Margate and Penzance, or to take two nearer places, Ryde and Shanklin.

Dr. B. W. Richardson delivered the Congress Lecture,

Woman as a Sanitary Reformer.

In the course of which, he said: It is in those million centres we call the home that sanitary science must have its true birth. It is from those centres the river of health must rise. I press this office for the prevention of disease on womenkind, not simply because they can carry it out, but because it is an office which man never can carry out; and because the whole work of prevention waits and waits until the woman takes it up and makes it hers. The man is abroad, the disease threatens the home, and the woman is at the threatened spot. Who is to stop it at the door, the man or the woman? The house is her citadel. A woman should master physiology so far as to understand the general construction of the human body. She should be rendered fully conversant with the different changes of food that are required. She should be taught the relationship which solid foods hold to liquid food or drinks. She should be told what drinks are foods; and she should specially understand what are the particular foods required for the young during the periods of active growth. If women only knew what foods were requisite to feed the skeleton or bony framework of the living body while that skeleton is in the course of growth, and if she would act upon her knowledge, as she almost certainly would if she possessed it, there would hardly be one deformed child left in the land in one or two generations. Rickets, with all its attendant miseries of bowed legs, crooked spines, and humped backs, would pass away as if by the spell of an invisible enchantress. After the understanding of the digestive system, the woman should learn the principal facts relating to the general functions of the body, and she would require to find out how most effectively she can maintain, in the varying seasons, an even and equable temperature. She would aim to consider in what way she could keep the air of the house free of that most objectionable of mischiefs, dust. She would demand to have marked for her on a map or plan the precise position of every drain-pipe in the establishment, and would insist, with intelligent skill, on having every drain kept systematically clean. She would learn enough of the chemistry of water to enable her to determine with facility whether a water was wholesome and drinkable; and she would have a sufficient amount of skill to direct how an impure water might be purified and made safe for her and hers to drink, and use for all domestic requirements. She would see to it that damp had no place in any apartment. That she would acquire a thorough knowledge of the best art of cookery; a good knowledge in choosing foods in season; that she would find out what foods are most suitable for persons of different age and constitution; and she would distribute food with well-balanced hand, neither feeding over-indulgently or parsimoniously. But she would be better able than anyone else to put to the test the experience whether it is good or necessary to go to the living animal creation at all for human food. Women should know the correct names and characters of the more common diseases,

* Details of the meteorology of St. Mary's, Scilly Islands, Penzance, Falmouth, the Channel Islands, Barnstable, Ilfracombe, Llandudno, Torquay, Hastings, St. Leonard's, Ventnor, the Undercliff, Isle of Wight, and Ramsgate, will be found in papers by Dr. Tripe, on *The Winter Climates of some of our Health Resorts*, published in the Sanitary Record of Jan. 10, Feb. 15, Dec. 15, 1879, and Jan. 15 and Feb. 15, 1880.—Ed. *S. R.*

and they should know, by sight, the every-day contagious or communicable diseases. All the best known methods of preventing disease should be at their fingers' ends, and the rule of the sick-room should be their faithful care. The woman should know everything about registering the temperature of the sick room and degree of humidity; the mode of ventilation; the different special methods of feeding, washing, and changing the sick; the most efficient means of disinfecting, and of removing or destroying the poisons of the communicable diseases. How, in this way, the woman could help the physician, none but the physician can understand. Women should understand the little appreciated law of temperaments. The sanguine child, ruddy and red, with blue eyes, red hair, strong muscle, quick movements, restless limb, she may set to study at books, while she curbs exercise, with no fear that books will kill, for it will outlive any book. The bilious child, with dark eyes, dark skin, black hair, stolid expression, thoughtful brow, she will not set to the study of books as the work of life; for books may kill; physical exercise may save, but will never be carried voluntarily to injury. The nervous child, with fair skin, light hair, blue eye, quick but feeble movement, timid glance, yet, perhaps, unbounded ambition, she will spirit gently, will balance between physical and mental labour, will apportion excess of neither, and will never urge unduly to any effort. The lymphatic child, large of body, pale, with grey or blue eyes, brown hair, shambling step, watery lip, and slow determination, she will rouse to action both physical and mental, with the full assurance that neither effort will do anything but good. She should study also emotional contagion with special care, and on one emotion, that of fear, she should keep the most watchful observation, because she will discover it to be the most common and disastrous of all contagions. She will never excite it for a moment by story of superstition or dread. Finally, in physical psychological training there would stand out for contemplation, and action founded upon it, one more subject; that marvel of the marvellous in living phenomena, heredity of type and action, extending to health, and extending, alas! to disease in its deepest foundations. She should stand to resist, with her full persuasive might, that process which I have elsewhere called the intermarriage of disease. She will tell her sisters what that terrible process means. She will tell that diseased heredity united in marriage means the continuance of the heredity, as certainly as that two and two make four; that madness, consumption, cancer, scrofula, yes, and certain of the contagious diseases too, may be perpetuated from the altar; and that the first responsibilities of parents towards the offspring they expect, ought to be, not how to provide for wealth and position over which they have no control, but that preliminary healthy parentage which is the foundation of health, and without which position and wealth are shadowy legacies indeed. These I set before this Congress as the heads of the educational programme for our modern woman in her sphere of life and duty.

General Meeting of the Congress.

At the closing general meeting of the Congress, Earl Fortescue presided, supported by Sir Stafford Northcote, Bart., M.P., Sir Antonio Brady, the Mayor of Exeter, Mr. Rawlinson, C.B., Mr. Chadwick, C.B., Major Wyatt-Edgell, Professor De Chaumont, Dr. Richardson, Mr. Grantham, Mr. Symons, Professor Corfield, Colonel Jones, V.C., Mr. Rogers Field, etc.

Earl Fortescue said, they might congratulate the Sanitary Institute on the Congress having had a most satisfactory meeting—a meeting, he was sure, which had been of use to the Institute, and he heartily trusted that it had not been without its use to Exeter and its inhabitants, who, from its Chief Magistrate downwards, had given them so kind and cordial a welcome. He remembered that, some years ago, Mr. Chadwick said that schools, while diffusing education, much needed through the country, had unfortunately been at the same time, unhappily, the means of infusing some infectious diseases. The case was established beyond all controversy. This was the ground of the resolution which he had to move:—'That it is desirable to move the Vice-President of the Privy Council to allow the days of absence of children suffering from infectious disease, or in whose family infectious disease exists, when duly certified by a registered medical practitioner, to be deducted from the statutory number of days required to qualify for examination by the Government School Inspector.'

Dr. Richardson seconded the resolution, and it was unanimously adopted.

It was next resolved, on the motion of Earl Fortescue, seconded by Dr. Richardson, 'That, in the opinion of this meeting, the system of examination introduced by the Sanitary Institute of Great Britain should be further extended and supported.'

The third resolution which the noble President submitted was also adopted. It was a formal one, intended to be forwarded to the United States Minister, in reference to the successful drainage of the city of Memphis (see page 137), expressive of the satisfactory manner in which that great object had been accomplished, and of the hope that the example would have a reflective influence upon the drainage plans of English cities.

The Congress Dinner.

The proceedings of the Congress terminated with the usual annual dinner, at which the President of the Congress (Earl Fortescue) presided.

After the usual toasts; Dr. Shapter responded for the medical profession.

Mr. Woodman, Medical Officer of Health for Exeter, suggested that men in his position should be removable only on appeal to the Local Government Board, contending that the power of dismissal possessed by local authorities trammeled them too much.

Mr. Boulnois proposed 'The Officers of the Sanitary Institute,' to which Mr. Symons replied.

The Parkes Museum of Hygiene has been re-opened for the season. Several additions have recently been made to the collection of Sanitary Appliances, including a good show of Concrete and Stoneware goods from the Poole Pottery District. Messrs. Tonks and Son have added to their contribution a model of a new Ventilator called 'The Architrave Ventilator', designed by Mr. Mark H. Judge for the purpose of making an architectural feature of the provision for ventilation. The Parkes Museum will continue to be open free on Tuesdays, Thursdays, and Saturdays.

The Sanitary Institute of Great Britain has awarded to Messrs. W. Woollams & Co., of High Street, Marylebone, a medal, 'as a special mark of merit' for their 'paperhangings free from arsenic' shown at the late Croydon Exhibition; after an exhaustive examination of a large number of samples.

THE

SANITARY RECORD.

OCTOBER 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

In consequence of the pressure on our space this month, we are compelled to omit our usual leader, Notes of the Month, Law Reports, Reports of Medical Officers of Health, etc.; and to hold over our Report of the Sanitary Exhibits at Exeter until next month.

DRAINAGE IMPROVEMENTS ON THE CONTINENT.

THE necessity for constructing drainage works for populous cities came to be universally recognised in Germany; in proof of which assertion we may point to the works at Dantzig, Berlin, Breslau, Munich, Frankfort-on-the-Main, and other large towns, either completed, in course of construction, or for which plans were prepared. A healthy sign of the movement of rendering towns pure and salubrious by means of canalisation is the notable fact that it has made progress in Germany, where drainage works are being planned even for the smaller towns.

Mr. J. Gordon, C.E., formerly of Carlisle, now resident at Frankfort, has had and still has a large share in the construction of this class of engineering works. We have the satisfaction of learning that his plans for the main drainage of Munich have every chance of being adopted, for at a meeting of the Town Council in the capital of Bavaria, it was resolved, certainly in the face of some strong opposition—curiously enough supported by the Munich Society of Architects and Engineers—to proceed to the consideration of this gentleman's plans without delay. We all know from experience that such a decision is half the battle, and we cannot, therefore, be considered too sanguine in congratulating Mr. Gordon on his success in Munich. We find that he has also submitted detailed plans for the drainage of Ludwigshafen (*Bericht über die Canalisation des Schleussengrabens der Stadt Ludwigshafen*), formerly the *tête-de-pont* of Mannheim when this town was a fortress, but now rising rapidly into importance as a place of commerce, and the port, so to say, of the second capital of the Grand Duchy of Baden. The works at Ludwigshafen, which had twice been reported upon, amongst other gentlemen, by Councillor Morgens, the eminent architect and engineer of Speyer, include the construction of a principal sewer in the so-called Schleussengraben, which itself is to be utilised and straightened as part of the scheme. There are to be smaller sewers laid down, in view of the ultimate complete system of drainage for the town. Estimates had been prepared, which in Mr. Gordon's opinion were much too low,—his own estimate amounting to 133,367 marks, or about £7,000. His plan embraced the construction of an extent of brick sewers, 590 mètres in length, and measuring 1.26 × 0.84 metres, with concrete foundations and filling in, up to the chord of the arch, and pointed faces between the brick shells, and upon the outside of the arch; with pipes for draining off the ground water during the progress of the works, the medium depth of the sewer to the finished inner level being 2.81 mètres. In the second place he provides for another line of brick sewer, 550 mètres long, measuring 1.50 × 1 mètre, with a depth of 3.12 mètres; for the construction of ten man-holes; twenty ventilating shafts (not arranged for in the original plans); four gullies, including the pipes appertaining thereto; and the main-wall or inlet, according to plan. There is a provision, moreover, for a pumping station, which, together with a system of sluices, he considers absolutely necessary in case of high or flood waters, an eventuality, considering the close proximity of the Rhine, likely to arise very frequently, and without which the drainage works of Ludwigshafen would be incomplete.

THE PUBLIC HEALTH

DURING SEPTEMBER 1880.

The mean temperature during September, at the Royal Observatory, Greenwich, was 59°.7, which exceeded by no less than 3°.2 the average September temperature, at Greenwich, in 100 years. In September 1875 the mean temperature was equal to 60°.0, but, with this exception, the highest September mean temperature since 1869 was 57°.9 in 1874. An excess of temperature prevailed at Greenwich on eighteen of the thirty days last month; and the daily mean temperature ranged from 73°.2 on 4th, when the excess was equal to 13°.5, to 49°.0 on 19th, when the deficiency was 7°.8. Rain was measured at Greenwich on twelve days during the month to the aggregate amount of 4.0 inches; the average September rainfall recorded at Greenwich during sixty-one years was 2.4, showing an excess last month of 1.6 inches. The rainfall last month considerably exceeded the amount measured in any September since 1871, when 4.1 inches were recorded. The sun was above the horizon during 376.9 hours in September, and 119.3 hours of bright sunshine were recorded; the average amount of bright sunshine in the month of September, in the three years 1877-8-9, was 116.6 hours, or 2.7 hours less than the amount measured last month, which exceeded by thirteen hours the amount recorded in the preceding month of August. South-westerly winds generally prevailed throughout the month, except from 7th to 10th, and on the last five days of the month, when the wind was mainly north-easterly.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing an estimated population of about seven-and-a-half mil-

lions of persons, or nearly a third of the entire population of England and Wales, 25,023 births, and 17,294 deaths were registered during the five weeks ending 2nd October. The births were equal to an annual rate of 34.8 per 1,000 of the estimated population of the twenty towns; it was 35.0 in London, and 34.6 in the nineteen provincial towns; and ranged from 30.1 and 31.0 in Plymouth and Oldham, to 37.0 and 37.7 in Leicester and Salford. The mean annual death-rate, during the five weeks of September, was equal to 24.1 per 1,000, against 19.1, 20.8, and 24.5 in the three preceding months. The average September death-rates, in the twenty towns, were 19.9, 21.2, and 19.1 respectively, in the three years 1877-8-9. The English urban death-rate was exceptionally high during last month, a result entirely due to the excessive fatality of infantile diarrhœa. The mean temperature in September 1877 was very considerably below the average, while the mean differed but slightly from the average in 1878 and 1879: the excess of diarrhœa fatality, which caused the high death-rate during last month, may be mainly attributed to the high mean temperature, which showed an average daily excess of 3°.2 throughout the month. The heavy rainfall of last month does not appear to have counteracted the effect of the high temperature upon the mortality from diarrhœa.

The lowest annual rate of mortality, in the twenty towns, during September, was 18.8 in Plymouth. The rates in the other towns, ranged in order from the lowest, were as follow:—London, 20.2; Bristol, 20.4; Birmingham, 22.7; Portsmouth, 23.1; Oldham, 24.1; Brighton, 25.2; Sheffield, 25.5; Newcastle-upon-Tyne, 26.2; Bradford, 26.7; Manchester, 27.0; Leeds, 27.2; Nottingham, 29.0; Wolverhampton, 29.0; Hull, 31.7; Norwich, 32.9; Salford, 33.0; Liverpool, 33.7; Sunderland, 34.7; and the highest rate during the month was 34.8 in the borough of Leicester. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual-death-rate, during September, averaged 27.8 per 1,000, whereas in London it did not exceed 20.2. The excessive death-rate in the provincial towns was all but entirely due to the high rate of mortality from infantile diarrhœa.

The 17,294 deaths from all causes in the twenty towns last month included 4,937 which were referred to the seven principal zymotic diseases; of these, no less than 3,597 resulted from diarrhœa, 525 from scarlet fever, 305 from fever (principally enteric), 287 from whooping-cough, 111 from measles, 91 from diphtheria, and 21 from small-pox. These 4,937 deaths were equal to an annual rate of 6.9 per 1,000 in the twenty towns during the five weeks under notice, against 3.0, 4.5, and 7.8 in the three preceding months. The zymotic death-rate did not exceed 4.3 per 1,000 in London, but averaged 9.3 in the nineteen provincial towns; this excess in the provincial towns was entirely due to the greater fatality of diarrhœa. The annual death-rate from these seven diseases during September did not exceed 4.2 in Plymouth, and 5.3 in Brighton and Bristol, while it ranged in the other towns to 12.1 in Sunderland, 13.2 in Hull, 14.4 in Salford, 15.2 in Norwich, and 16.1 in Leicester: both Salford and Leicester also showed exceedingly high rates from these diseases during August. The annual death-rate from diarrhœa (about 80 per cent. of which occurs amongst infants under one year of age), which had been equal to 2.4 and 5.8 per 1,000 in the twenty towns during July and August, was equal to 5.0 in the five weeks of September; this rate, which was but 2.6 in London, averaged no less than 7.3 in the nineteen provincial towns. In the provincial towns diarrhœa fatality was greater in September than it had been in August, while it showed a marked decline in London. The lowest death-rates from diarrhœa last month among the provincial towns were 3.3 and 3.5 in Plymouth and Bristol; it ranged upwards in the other towns to 11.6 in Salford and Hull, and 14.3 in Leicester. The deaths referred to diarrhœa in these twenty towns in the corresponding five weeks of 1878 and 1879 were, respectively, 1,747 and 1,346; the 3,597 fatal cases in the five weeks of September last were therefore more than double the number returned in either of the two corresponding periods. The 525 deaths from scarlet fever last month showed a slight increase upon recent declining monthly numbers; the largest proportional fatality of this disease occurred in Sunderland, Norwich, Bristol, and Salford. The death-rate from measles showed a further decline, and was exceptionally low. The deaths from whooping-cough were also less numerous, although they again showed an excess in Liverpool. The 91 deaths referred to diphtheria showed a further increase upon recent monthly numbers; they included 53 in London, 10 in Liverpool, 6 in Birmingham, and 4 in Portsmouth. The 305 deaths referred to fever (including typhus, enteric and simple) showed a marked increase upon the numbers returned in recent months, and included but 98 in London, while 207 were returned in the nineteen provincial towns; the fatality from fever was therefore more than twice as great in the provincial towns as it was in the metropolis. The highest death-rates from fever in the twenty towns during September occurred in Portsmouth, Norwich, Salford, Leeds, and Sheffield. Small-pox caused 20 more deaths in London, and one in Liverpool, whereas no death from this disease was recorded in any of the eighteen other large towns; the fatality from small-pox in London during September exceeded that which occurred in August. The number of small-pox patients in the metropolitan asylum hospitals, which had been 216, 178, and 128 at the end of June, July, and August, further declined to 95 at the end of September. The average weekly numbers of new cases of small-pox admitted to the hospitals, which had been 41 in June, 21 in July, and 23 in August, did not exceed 15 in the five weeks of September. The decline, both of patients under treatment in these hospitals, and of new cases of admission during September, affords satisfactory evidence of a decline of small-pox prevalence in London.

The fatality of diseases of the respiratory organs showed a slight increase during September. The weekly number of deaths referred to these diseases in London, which had steadily decreased in the six preceding months from 254 in March to 155 in August, rose to 160 during the five weeks of September, but were 3 below the corrected weekly average for the corresponding periods in the ten years 1870-9; they were equal to an annual rate of 2.3 per 1,000. The annual death-rate from lung diseases during September ranged in those of the nineteen provincial towns for which the information is available, from 0.8 and 1.7 in Plymouth and Newcastle-upon-Tyne, to 3.6 in Oldham, 4.4 in Sunderland, and 4.6 in Liverpool.

In the outer ring of suburban districts around London (having a population of little less than a million persons), the annual death-rate from all causes during September did not exceed 17.9 per

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,664,149	12289	7063	2324	1178	*	*	*	1227	1512	20	54	261	53	105	96	821	803	747	227	1256	35.0	20.2	4.3	2.3	
Abersychan	14,000	36	19	4	5	1	1	3	5	3	..	..	..	..	1	..	2	4	1	..	..	31.3	16.5	2.6	3.5	J. W. Mulligan, M.D.
Abingdon	6,033	15	11	8	..	..	..	2	1	5	..	..	..	..	..	..	5	1	1	..	..	30.2	22.2	10.1	2.0	W. T. G. Woodforde, M.D.
Acton‡	16,000	68	18	8	..	3	..	4	3	2	..	..	..	..	..	..	2	1	3	2	..	44.3	11.7	1.3	0.7	T. Francis.
Altrincham	12,000	36	10	2	5	1	..	2	..	4	..	..	1	..	1	..	2	1	..	1	1	36.5	10.1	4.1	1.0	G. H. Atwell.
Ashton-under-Lyne	33,417	105	112	39	27	3	7	22	14	38	..	..	5	..	..	2	31	10	7	..	13	38.2	40.8	13.8	3.6	W. H. Hughes.
Aspull	8,000	25	14	6	1	..	1	2	4	2	..	1	..	..	..	..	1	1	..	1	..	38.0	21.3	3.0	1.5	H. Smith.
Astley Bridge†	5,750	15	13	4	3	..	..	3	3	1	..	1	..	..	..	..	..	2	..	..	..	34.0	29.5	2.3	4.5	R. Settle, M.D.
Aston Manor	52,821	170	121	61	17	6	4	19	14	45	..	..	..	4	3	..	38	9	8	2	..	39.2	27.9	10.4	2.1	H. May.
Audenshaw	6,000	31	17	6	7	1	..	1	2	9	..	..	..	..	..	1	8	..	..	..	..	62.9	34.5	18.3	0.0	R. Slater.
Baildon	5,000	10	7	3	1	1	..	..	2	3	..	..	..	..	..	..	3	..	..	..	..	24.3	17.0	7.3	0.0	H. Walker.
Banbury‡	13,500	*	32	11	4	1	2	5	9	7	..	..	1	..	..	1	5	1	6	..	..	*	24.7	5.4	0.8	R. Grimbly.
Bangor	7,835	*	16	4	3	..	2	5	2	..	..	..	..	..	..	..	..	1	3	..	..	*	24.8	0.0	1.6	H. Rees.
Barnsley	30,000	36	35	7	15	1	1	2	9	13	..	..	..	..	..	2	11	4	2	1	3	14.6	14.2	5.3	1.6	M. T. Sadler, B.A., M.D.
Barrow-in-Furness	40,000	146	95	40	23	8	7	14	3	23	..	..	2	..	6	2	13	8	8	5	5	44.4	28.9	7.0	2.4	J. Settle.
Bath†	53,469	100	100	27	13	6	7	24	23	4	..	..	..	1	1	2	..	7	7	2	14	24.4	24.4	1.0	1.7	A. B. Brabazon, M.D.
Batley	29,851	90	71	33	14	2	7	9	6	25	2	..	..	..	3	2	18	7	6	..	1	36.7	28.9	10.2	2.9	W. Bayldon.
Beccles	5,000	13	10	5	..	1	..	2	2	3	..	..	..	..	..	..	3	..	1	..	..	31.6	24.3	7.3	0.0	E. B. Crowfoot, M.B.
Beckenham†	12,200	*	14	8	3	1	..	1	1	6	..	..	..	..	1	..	5	..	..	..	..	*	15.2	6.5	0.0	C. O. Baylis, M.D.
Belgrave	8,000	25	18	9	6	..	..	1	2	11	..	..	..	..	..	..	11	1	..	..	..	38.0	27.4	16.7	1.5	A. W. Emms.
Bethesda	6,610	20	8	1	..	2	1	2	2	2	..	..	..	2	..	..	..	1	1	..	..	36.8	14.7	3.7	1.8	H. Rees.
Bilston	25,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. M. Hancox.
Bingley	9,000	33	12	4	2	2	1	2	1	3	..	..	..	..	..	..	3	..	2	..	..	44.6	16.2	4.1	0.0	J. W. Craig, M.D.
Birmingham‡	394,738	1320	850	372	151	23	23	174	107	288	..	4	6	6	12	11	249	92	63	17	72	34.9	22.5	7.6	2.4	A. Hill, M.D.
Bisley	5,264	24	11	7	..	..	1	1	2	4	..	..	..	..	..	..	4	..	..	..	..	55.4	25.4	9.2	0.0	T. Partridge.
Blyth	2,000	10	2	..	1	..	..	..	1	1	..	..	..	..	..	..	1	..	..	..	..	61.0	12.2	6.1	0.0	H. D. Ward, M.D.
Bolton†..	106,500	296	197	80	47	12	7	31	20	97	..	2	10	..	2	1	82	13	12	4	1	36.2	24.1	11.9	1.6	E. Sergeant.
Bootle-cum-Linacre	26,500	*	67	25	16	5	5	10	6	21	..	..	3	1	1	4	12	3	3	..	1	*	30.8	9.6	1.4	R. J. Sprakeling.
Boston†	15,000	37	34	14	3	..	4	3	10	..	..	..	..	..	..	..	..	2	4	..	7	32.1	29.5	0.0	1.7	W. Clegg.
Bradford (Lanc.)‡	15,000	95	63	30	22	*	*	6	5	21	..	..	..	..	..	1	21	8	1	..	..	66.1	43.8	14.6	5.6	J. Hudson.
Bradford (Yorks.)‡	197,196	593	505	182	122	22	17	100	62	173	..	2	13	2	8	6	142	53	30	6	28	31.4	26.7	9.1	2.8	H. Butterfield.
Braintree	5,000	*	9	4	1	..	..	3	1	4	..	..	..	..	..	..	4	..	3	..	..	*	21.9	9.7	0.0	J. Harrison.
Brentford	11,557	59	14	8	..	1	..	2	3	1	..	..	..	..	..	..	1	..	1	..	..	62.1	14.7	1.1	0.0	J. Williams.
Bridgnorth	6,000	16	11	2	..	1	1	2	5	3	..	..	..	..	..	1	2	..	..	1	..	38.9	26.8	7.3	0.0	A. Mathias.
Bridgwater	13,000	46	25	10	2	2	..	7	4	6	..	1	1	..	..	..	4	..	1	1	4	43.1	23.4	5.6	0.0	F. J. C. Parsons.
Bridport	8,145	21	7	1	..	1	..	2	3	1	..	..	1	..	..	..	..	3	..	..	1	31.4	10.5	1.5	4.5	G. M. Evans.
Brighton‡	107,321	327	259	70	*	*	*	*	72	54	..	..	7	2	3	3	39	*	*	9	39	31.8	25.2	5.3	*	———
Bristol‡	213,536	682	417	117	*	*	*	*	79	108	..	1	26	..	3	7	71	*	*	22	60	33.3	20.4	5.3	*	———
Bromley (Kent)†	14,293	37	17	6	..	1	1	6	3	2	..	..	..	..	..	..	2	1	4	1	..	33.8	15.5	1.8	0.9	C. O. Baylis, M.D.
Bromsgrove	6,967	30	6	2	..	..	..	3	1	2	..	..	..	..	..	..	2	2	1	..	..	52.4	10.5	3.5	3.5	C. Carey.
Brownhills	11,000	31	15	10	..	..	..	3	2	5	..	..	..	1	..	..	4	1	..	..	..	34.3	16.6	5.5	1.1	D. E. Flinn.
Burnley‡	56,000	*	144	78	29	5	4	22	6	77	..	..	2	..	..	..	75	11	9	..	..	*	26.8	14.3	2.0	T. Dean, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths (from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Bursledm..	29,159	83	68	39	19	..	..	9	1	39	..	..	..	..	5	1	33	*	5	..	..	34.6	28.4	16.3	*	J. M. Taylor.
Burton-upon-Trent	33,000	100	74	28	13	3	3	16	11	22	..	2	..	..	..	3	17	6	15	..	5	36.9	27.3	8.1	2.2	C. Perks.
Bury†	50,000	136	103	44	19	..	..	..	28	39	1	1	2	..	..	..	35	5	8	..	8	35.5	26.9	10.2	1.3	H. Ashworth.
Bury St. Edmunds	15,600	30	39	17	6	4	..	3	9	20	..	..	1	..	2	..	17	..	3	..	5	23.4	30.4	15.6	0.0	F. W. Clarke.
Camborne	15,000	*	34	13	5	1	3	7	5	9	..	..	..	..	..	3	6	1	2	1	..	*	27.6	7.3	0.8	E. S. Angove.
Cambridge	34,500	74	59	24	9	2	1	9	14	20	..	..	..	..	..	1	19	3	5	1	6	26.1	20.8	7.1	1.1	B. Anningson, M.D.
Canterbury†	20,962	46	42	18	6	1	..	8	9	14	..	..	..	..	..	..	14	8	3	1	5	28.6	26.1	8.7	5.0	F. Wacher.
Cardiff	82,364	233	161	58	31	7	8	39	18	43	..	1	4	..	1	3	34	12	14	10	12	34.4	23.8	6.4	1.8	H. J. Paine, M.D.
Carlisle†	35,000	89	70	23	13	4	1	11	18	25	..	..	3	..	2	3	17	9	3	1	8	33.1	26.1	9.3	3.4	R. Elliot, M.D.
Carnarvon	10,407	21	25	9	2	..	1	8	5	4	..	..	..	..	..	1	3	2	4	1	..	24.6	29.2	4.7	2.3	H. Rees.
Chelmsford	9,700	24	11	5	3	..	1	1	1	5	..	..	1	2	..	..	2	..	1	..	1	30.1	13.8	6.3	0.0	E. H. Carter.
Cheltenham‡	45,000	100	92	37	26	6	..	17	18	23	..	2	..	1	..	..	20	7	3	2	4	23.2	21.3	5.3	1.6	T. Wright, M.D.
Chiswick	12,000	49	25	11	4	2	3	4	1	7	..	1	1	..	..	..	5	..	7	..	..	49.7	25.4	7.1	0.0	F. C. Dodsworth.
Cirencester	7,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F. T. Bond, M.D.
Cleckheaton	9,250	21	24	8	5	3	4	1	3	6	..	..	..	..	..	3	3	2	1	..	..	27.6	31.6	7.9	2.6	H. O. Steele.
Cockermouth	5,550	*	6	..	1	..	..	3	2	..	..	..	..	..	..	..	..	1	..	1	..	*	13.2	0.0	2.2	J. Ward, M.D.
Colchester	28,924	67	56	17	16	4	1	9	9	15	..	..	6	..	..	2	7	4	4	1	5	28.2	23.6	6.3	1.7	E. Waylen.
Congleton	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	P. M. Davidson.
Consett‡	7,868	27	11	6	2	..	1	2	..	6	..	1	..	..	..	..	5	..	2	..	..	35.8	14.6	8.0	0.0	W. M. Renton, M.D.
Coseley	23,000	58	24	9	2	3	3	4	3	6	..	..	1	..	1	..	4	..	2	3	..	30.7	12.7	3.2	0.0	J. Eagleton.
Coventry†	41,000	72	72	17	12	5	6	16	16	27	..	..	5	..	1	1	20	4	4	2	2	22.9	22.9	8.6	1.3	M. A. Fenton, M.D.
Cowpen	5,000	14	12	3	6	..	2	1	..	6	..	..	..	..	..	1	5	..	..	1	..	34.1	29.2	14.6	0.0	H. D. Ward, M.D.
Crompton	10,000	34	15	3	4	..	..	5	3	..	..	..	..	..	..	..	..	3	..	..	..	41.4	18.2	0.0	3.6	W. Brooke, M.D.
Croydon	71,000	207	114	47	17	4	6	20	20	39	..	..	2	2	1	1	33	3	7	3	15	35.5	19.5	6.7	0.5	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	L. Armstrong.
Derby‡	80,385	259	213	78	50	5	8	40	32	68	..	11	..	..	3	4	50	20	11	2	20	33.6	27.6	8.8	2.6	W. Iliffe.
Devonport‡	50,000	149	84	26	13	5	1	16	23	18	..	2	1	..	..	1	14	8	6	..	5	31.1	17.5	3.8	1.7	J. May, jun.
Dorchester	7,500	18	15	8	..	..	..	3	4	3	..	..	..	..	..	..	3	1	2	..	1	29.2	24 3	4.9	1.6	E. J. Day.
Dover	33,636	126	64	30	6	2	5	10	11	17	..	..	..	..	..	1	16	6	4	3	9	45.6	23.1	6.1	2.2	M. K. Robinson, M.D.
Droitwich	3,600	8	6	..	1	..	..	2	3	1	..	..	..	..	..	..	1	1	..	..	3	27.0	20.3	3.4	3.4	H. Swete, M.D., S.Sc.C. Camb.
Droylsden	8,000	22	21	8	4	2	2	1	4	10	..	..	1	..	2	..	7	1	3	..	..	33.4	31.9	15.2	1.5	R. Slater.
Eastbourne	18,000	*	36	15	6	2	1	8	4	12	..	..	..	1	3	..	8	1	4	..	..	*	24.3	8.1	0.7	E. F. Fussell, M.B.
East Dereham	5,791	7	12	4	1	1	1	1	4	2	..	..	1	..	..	..	1	..	1	..	..	14.7	25.2	4.2	0.0	H. B. Vincent.
Epsom	7,550	17	9	8	1	..	..	..	..	7	..	..	..	..	..	..	7	..	..	..	..	27.4	14.5	11.3	0.0	E. L. Jacob.
Evesham	4,888	*	4	2	2	..	..	..	..	3	..	..	..	..	..	..	3	..	..	..	..	*	10.0	7.5	0.0	G. H. Fosbroke, jun., S.Sc. C. Cam.
Failsworth	8,000	*	15	5	4	..	..	4	2	3	..	..	..	..	..	..	3	2	2	1	..	*	22.8	4.6	3.0	G. W. Beattie, M.D.
Farnham	5,000	11	12	4	..	..	..	4	4	2	..	..	..	..	..	1	1	..	1	..	1	26.8	29.2	4.9	0.0	S. G. Sloman, jun.
Fenton	14,000	45	48	21	10	1	1	11	4	13	..	..	1	..	..	..	12	8	2	..	..	39.1	41.7	11.3	7.0	A. V. Griffiths.
Finchley	11,339	43	14	4	1	1	..	3	5	5	..	..	..	..	..	..	5	..	..	1	..	39.6	12.9	4.6	0.0	J. Turle, M.D.
Fleetwood	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Porter.
Garston	8,500	32	15	7	1	2	..	2	3	5	..	..	1	..	..	..	4	1	2	1	..	45.8	21.5	7.2	1.4	J. A. Fisher.
Glossop†	18,697	48	34	15	6	1	..	7	5	9	..	..	..	..	..	..	9	5	2	..	..	33.5	23.7	6.3	3.5	J. Rhodes.
Gloucester	37,907	89	79	23	14	2	4	19	17	20	..	1	..	..	..	..	19	7	7	1	10	28.6	25.4	6.4	2.2	J. P. Wilton.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1880—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Goole	10,205	30	21	7	7	..	3	4	..	14	..	..	..	..	1	1	22	2	2	1	1	35.8	25.0	16.7	2.4	J. Mitchell Wilson, M.B., S.Sc.C.
Gorton†	32,000	95	80	44	18	3	..	9	6	45	..	1	1	..	1	1	41	4	6	..	..	38.7	32.6	18.3	1.6	R. E. Hammond.
Great Driffield	6,033	20	12	7	1	..	..	4	..	2	..	..	..	..	..	..	2	..	..	..	..	40.3	24.2	4.0	0.0	D. Ridpath, M.D.
Guildford	10,167	24	12	5	..	..	..	4	3	6	..	..	..	..	..	..	6	..	1	..	..	28.7	14.4	7.2	0.0	J. Morton, M.B.
Halifax†	72,000	275	116	41	21	*	*	4	20	9	..	1	1	..	2	..	5	24	11	2	15	38.9	21.0	1.6	4.3	D. Ainley.
Harborne	6,000	8	9	2	1	1	..	2	3	1	..	..	..	..	..	..	1	1	..	..	..	16.2	18.3	2.0	2.0	R. W. Smith, M.D.
Harwich	7,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. K. Morgan.
Haslingden‡	14,000	48	16	6	1	..	..	6	3	3	..	1	..	..	..	..	2	..	..	..	..	35.8	11.9	2.2	0.0	J. A. Harrison, M.D.
Heywood	23,000	*	54	18	11	2	2	10	11	27	..	..	..	..	..	..	27	..	4	2	..	*	28.6	14.3	0.0	H. Wisken.
Hinckley	7,500	29	21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	47.1	34.1	*	*	W. H. Griffiths.
Hindley	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Horwich	4,315	9	7	1	1	..	..	2	3	2	..	1	..	..	..	..	1	2	1	..	..	25.4	19.7	5.6	5.6	G. H. Whitaker.
Huddersfield‡	81,780	245	197	66	35	9	10	39	38	42	..	1	5	..	2	4	30	27	19	6	16	31.2	25.1	5.4	3.4	J. S. Cameron, M.D., B.Sc.
Hull‡	149,627	497	454	206	*	*	*	*	62	190	..	..	4	..	13	7	166	*	*	16	20	34.7	31.7	13.2	*	
Hurst	7,000	14	10	4	1	1	1	3	..	3	..	..	..	..	..	..	3	1	2	..	..	24.3	17.4	5.2	1.7	T. Cooke.
Hyde	28,218	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
Ilfracombe	5,500	13	9	3	1	..	1	3	1	5	..	..	..	..	..	..	5	..	1	1	..	28.8	19.9	11.1	0.0	E. J. Slade-King, M.D., S.Sc.C.
Ilkeston	12,356	44	34	7	9	5	3	4	6	8	..	..	1	..	..	3	4	..	5	..	..	43.3	33.5	7.9	0.0	R. Wood.
Ipswich	48,001	137	140	63	34	5	2	16	20	64	..	..	..	..	..	1	63	2	11	4	5	34.7	35.5	16.2	0.5	G. S. Elliston.
Keighley	24,000	75	49	18	8	3	1	12	7	13	..	1	..	..	..	..	12	8	1	1	6	38.0	24.8	6.6	4.1	A. Roberts.
Leamington	24,500	47	33	13	5	3	2	6	4	17	..	..	7	1	..	..	9	..	6	1	2	23.3	16.4	8.4	0.0	J. S. Baly.
Leeds†	318,927	862	682	290	130	*	*	*	96	198	..	1	7	..	9	17	163	68	48	20	*	35.3	27.9	8.1	2.9	G. Goldie.
Leek	12,527	33	18	6	..	*	*	*	8	2	..	..	..	..	..	..	2	3	2	..	1	32.0	17.4	1.9	2.9	J. J. Ritchie.
Leicester‡	129,912	401	433	208	*	*	*	*	36	201	..	10	2	3	2	6	178	*	*	4	25	37.0	34.8	16.1	*	
Leigh	20,600	64	59	28	15	2	2	6	6	29	..	1	3	..	..	2	23	6	..	2	..	37.8	34.8	17.1	3.5	J. Hall.
Lichfield	8,129	20	16	4	1	..	..	5	6	6	..	..	..	..	..	1	5	2	..	..	..	29.9	24.0	9.0	3.0	G. A. Carter, M.D.
Lincoln†	32,103	88	94	42	25	1	2	12	12	50	..	1	..	..	3	1	45	5	2	1	11	35.7	38.2	20.3	2.0	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,000	13	5	1	2	..	..	1	1	..	..	..	..	..	..	..	..	..	1	..	..	39.5	15.2	0.0	0.0	C. Kelly, M.D.
Liverpool‡	544,056	1915	1756	616	504	70	59	339	168	606	1	9	38	10	76	37	435	239	106	55	174	36.7	33.7	11.6	4.6	J. S. Taylor, M.D.
Liversedge	13,750	33	30	16	4	..	2	3	5	5	..	..	..	..	..	..	5	3	..	..	..	29.2	26.5	4.4	2.7	W. J. Sykes, M.D.
Louth	10,750	29	19	5	3	..	1	4	6	2	..	..	..	..	..	..	2	4	1	2	4	32.8	21.5	2.3	4.5	R. Domenichetti, M.D.
Luton	24,200	59	54	27	12	2	1	7	5	22	..	..	..	1	..	1	20	2	8	..	2	29.7	27.1	11.1	1.0	H. Sworder.
Lytham	5,000	8	11	6	1	..	..	4	..	4	..	..	..	..	..	..	4	4	..	..	..	19.5	26.8	9.7	9.7	W. E. Pountney, M.B.
Macclesfield	36,641	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. Bland.
Maidenhead	8,281	20	11	7	1	..	..	2	1	2	..	..	..	..	..	..	2	..	..	1	..	29.4	16.2	2.9	0.0	W. T. G. Woodforde, M.D.
Maidstone‡	29,537	97	67	29	12	..	2	14	10	10	..	..	2	..	1	..	16	..	2	2	4	34.3	23.7	6.7	0.0	M. A. Adams.
Manchester‡	363,130	1131	941	333	*	*	*	*	114	278	..	12	31	2	6	10	217	*	*	18	110	32.5	27.0	8.0	*	
Merthyr Tydfil	52,000	154	118	28	23	8	4	24	25	23	..	14	1	..	1	4	3	13	9	2	3	32.8	23.8	4.9	2.8	T. J. Dyke.
Mexborough	6,000	43	14	9	4	..	1	..	..	6	..	..	1	..	..	..	5	..	..	..	..	87.2	26.4	12.2	0.0	W. Sykes.
Middlesbrough	58,988	189	178	78	54	5	8	21	12	49	..	7	6	..	3	3	30	40	6	3	2	39.0	36.7	10.1	8.3	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	T. B. Knott.
Mirfield	12,725	31	23	13	3	..	3	3	1	2	..	..	..	..	..	..	8	2	1	..	..	29.6	22.0	1.9	1.9	W. Marsden.
Morley	12,100	54	48	23	12	3	1	6	3	11	..	..	3	..	..	..	..	6	3	..	..	54.3	48.2	11.1	6.0	S. T. Steele, S.Sc.C.Camb.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1880.—*continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Moss-Side	16,500	48	30	8	6	1	1	9	5	4	..	1	..	..	..	1	2	1	5	..	..	35.4	22.1	2.9	0.7	A. E. Sutcliffe.
Neath	12,000	22	28	2	14	5	..	4	3	10	..	4	6	..	..	..	..	5	3	..	..	22.3	28.4	10.1	5.1	G. Ryding, M.D.
Nelson	12,000	34	16	7	1	1	1	1	5	1	..	..	..	..	..	..	1	2	..	1	..	34.5	16.2	1.0	2.0	T. Dean, M.D.
Newark‡	13,746	43	27	11	4	2	1	5	4	6	..	..	..	..	..	..	6	2	6	1	1	32.6	20.5	4.6	1.5	A. Ashby, M.B.
Newbury	9,796	24	21	7	2	1	1	3	7	7	..	..	..	..	..	..	7	..	..	1	1	29.8	26.1	8.7	0.0	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	62	35	16	11	2	1	1	4	18	..	..	..	..	..	..	18	..	1	1	..	41.9	23.7	12.2	0.0	St. J. Edwards, M.D.
Newcastle-upon-Tyne‡	149,366	512	375	139	91	*	*	*	39	105	..	3	11	..	3	6	81	24	27	13	33	35.8	26.2	7.3	1.7	H. E. Armstrong.
Norwich‡	85,827	299	271	104	*	*	*	*	50	125	..	1	24	..	10	9	81	*	*	3	11	36.4	32.9	15.2	*	———
Nottingham	173,627	457	432	184	62	14	20	85	67	121	..	..	10	..	6	12	93	45	28	4	18	32.0	30.3	8.5	3.2	E. Seaton, M.D.
Nuneaton	7,400	19	16	5	2	1	1	3	4	6	..	..	..	..	..	2	4	..	..	..	..	31.3	26.3	9.9	0.0	E. Peacock.
Oldham†	115,413	278	216	73	48	13	12	38	32	71	..	2	9	1	3	5	51	32	22	4	18	31.4	24.4	8.0	3.6	J. M. Sutton, M.D.
Ovenden	8,000	16	13	2	4	..	..	3	4	2	..	..	..	..	..	..	2	1	1	..	..	24.3	19.8	3.0	1.5	J. Steele.
Oxford‡	37,500	114	83	33	6	3	1	12	28	18	..	..	..	1	..	1	16	2	6	3	14	31.7	23.1	5.0	0.6	A. Winkfield.
Padiham and Hapton†	9,000	30	8	4	..	1	..	2	1	2	..	..	..	..	..	..	2	..	1	..	..	43.5	11.6	2.9	0.0	J. G. Booth.
Pembroke	15,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. P. Saer.
Penzance	12,000	34	24	10	2	..	..	10	2	6	..	..	1	..	2	..	3	2	3	1	..	34.5	24.3	6.1	2.0	G. B. Millett.
Peterborough	20,000	67	39	15	4	1	1	9	9	9	..	..	..	..	..	1	8	10	5	1	1	40.8	23.7	5.5	6.1	W. S. Thomson, M.D.
Plymouth‡	74,993	216	134	44	13	6	8	31	32	30	..	..	..	1	1	4	24	6	18	7	11	30.0	18.6	4.2	0.8	H. Greenway.
Pontypool	5,100	16	8	4	..	..	1	..	3	1	..	..	..	..	..	..	1	5	..	..	..	38.2	19.1	2.4	11.9	S. B. Mason.
Poole	11,350	35	13	5	2	..	..	3	3	2	..	..	..	..	..	..	2	..	..	1	1	37.5	13.9	2.1	0.0	H. A. Lawton.
Portsmouth‡	134,224	428	297	94	*	*	*	*	42	77	..	5	1	4	3	15	49	*	*	6	26	33.3	23.1	6.0	*	G. Turner.
Preston†	88,000	255	245	123	56	5	12	30	19	146	..	..	10	1	1	5	129	9	16	1	3	37.8	36.3	21.6	1.3	H. O. Pilkington.
Ramsgate‡	22,200	69	35	15	5	2	1	7	5	11	..	..	3	..	..	1	7	2	2	1	2	32.4	16.4	5.2	0.9	E. Walford.
Ravensthorpe (Yorks.) ..	4,560	15	13	6	1	1	1	4	..	1	..	..	1	..	..	..	..	..	2	..	..	40.0	34.7	2.7	0.0	W. Marsden.
Rawmarsh	9,652	38	17	4	4	4	..	3	2	10	..	..	5	..	3	..	2	1	2	..	..	47.9	21.4	12.6	1.3	W. J. Smith.
Reading‡	41,500	144	100	43	12	4	4	19	18	35	..	1	5	..	2	3	24	6	8	3	10	36.2	25.1	9.7	1.5	J. Shea, M.D.
Redditch	10,070	40	29	12	2	..	2	4	9	12	..	..	1	..	..	..	11	4	2	..	..	48.3	35.0	14.5	4.8	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	25	20	11	1	..	2	5	1	9	..	..	..	..	2	..	7	4	3	..	..	32.0	25.6	11.5	5.1	J. S. Hichens.
Reigate	18,000	39	25	7	..	..	2	5	11	8	..	..	..	1	..	..	7	1	3	..	..	26.4	16.9	5.4	0.7	E. L. Jacob.
Richmond (Surrey)	19,500	46	29	10	2	3	..	7	7	5	..	..	1	..	..	..	3	1	3	2	5	25.9	18.1	3.1	0.6	J. T. Rowland, M.D.
Rochdale	72,720	173	133	32	30	13	10	26	22	42	..	..	5	2	3	11	21	13	8	3	1	28.9	22.3	7.0	2.2	J. Henry, M.D.
Rochester	18,500	54	36	5	10	1	3	7	10	6	..	..	..	..	..	..	6	3	5	3	8	35.5	23.7	3.9	2.0	J. Sladen-Knight, M.D.
Romsey	4,481	11	13	7	1	..	1	..	4	6	..	..	..	..	..	..	6	..	..	..	..	29.9	35.3	16.3	0.0	F. Buckell.
Rotherham‡	34,404	139	83	30	16	2	2	10	13	17	..	..	5	..	..	2	10	4	18	..	5	42.1	25.2	5.2	1.2	J. Hardwicke, M.D.
Rowley Regis	27,000	105	40	19	12	1	..	4	4	8	..	..	..	..	1	..	7	5	2	3	..	47.3	18.0	3.6	2.3	J. G. Beasley.
Rugby	8,916	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. Wilson, M.D.
Runcorn	14,000	48	34	18	2	..	..	10	..	13	..	..	..	..	..	2	11	2	2	3	..	41.7	29.5	11.3	1.7	R. H. Mouritz.
Rusholme	12,500	33	19	8	3	1	1	4	2	6	..	..	..	..	..	1	5	4	1	1	..	32.1	18.5	5.8	3.9	J. Gregory.
Ryde	12,800	8	24	8	2	..	1	4	9	3	..	..	..	..	..	..	3	2	3	..	1	*	22.8	2.9	1.9	A. Platt Wilks, M.B.
Saffron Walden	5,942	12	10	1	2	..	1	1	5	3	..	..	..	..	1	..	2	..	..	1	1	24.6	20.5	6.1	0.0	W. Armistead, M.B.
Salford‡	185,786	671	588	236	170	15	17	96	54	257	..	3	22	2	6	16	208	57	31	9	40	37.7	33.0	14.5	3.2	J. Tatham, M.D., S.Sc.C.Camb.
Selby	5,720	28	11	7	2	..	..	1	1	8	..	..	..	..	..	..	8	..	..	..	1	59.6	23.4	17.0	0.0	J. M. Wilson, M.B., S.Sc.C.C.
Sheffield†	304,938	834	638	230	157	*	*	*	92	260	..	1	11	1	5	15	227	83	31	9	39	35.7	27.3	11.1	3.5	T. W. Hime, B.A., M.B.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1880—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1,000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping-Cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
SITTINGBOURNE†	9,000	33	14	6	4	1	..	3	..	2	..	..	..	..	..	..	2	..	..	..	..	47.8	20.3	2.9	0.0	H. G. Sutton.
SLOUGH ..	5,890	6	6	..	..	1	..	4	1	..	..	..	..	..	..	..	..	..	1	1	..	12.4	12.4	0.0	0.0	A. J. Southey.
SMETHWICK ..	21,000	68	39	18	6	..	..	8	7	19	..	..	..	..	..	..	19	5	1	..	..	39.4	22.6	11.0	2.9	W. Sutton.
SOUTHPORT ..	34,100	62	65	21	7	4	5	10	18	6	..	..	..	1	1	..	4	8	4	..	2	22.1	23.3‖	2.1	2.9	H. H. Vernon, M.D.
STALYBRIDGE ..	23,405	65	51	20	7	4	2	8	10	15	..	1	..	..	..	..	14	5	4	2	..	33.8	26.5	7.8	2.6	F. J. Roberts-Dudley
STOURBRIDGE ..	9,376	17	11	4	2	..	..	4	1	3	..	..	..	..	1	..	2	1	..	..	..	22.0	14.3	3.9	1.3	R. Eagar, M.D.
STRATFORD-ON-AVON..	7,899	*	18	6	1	1	1	3	6	5	..	..	..	..	..	..	5	1	2	..	3	*	27.7	7.7	1.5	G. H. Fosbroke, S. Sc. C. Camb.
STROUD ..	7,608	18	12	6	1	..	1	3	1	7	..	..	1	..	..	..	6	1	..	..	..	28.8	19.2	11.2	1.6	T. Partridge.
SUNDERLAND† ..	116,730	321	317	121	92	20	8	41	35	118	..	..	21	..	3	4	90	39	21	4	9	35.8	35.4	13.2	4.4	H. J. Yeld, M.D.
SWANSEA ..	65,890	212	80	24	13	2	3	25	13	6	..	..	..	..	..	1	5	9	8	3	4	39.1	14.8	1.1	1.7	E. Davies.
SWINTON ..	7,753	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	C. S. Blythman, M.B.
TAMWORTH ..	4,846	14	19	6	3	2	..	3	5	6	..	..	1	..	..	1	4	..	1	..	..	35.2	47.7	15.1	0.0	H. J. Fausset, M.D.
TAUNTON ..	16,227	41	22	6	1	1	..	7	7	4	..	..	..	..	..	..	4	2	2	..	5	30.7	16.5	3.0	1.5	H. J. Alford, M.D.
TEIGNMOUTH ..	7,250	14	18	5	1	1	1	3	7	2	..	..	..	..	..	..	2	1	1	1	1	23.5	30.2	3.4	1.7	W. C. Lake, M.D.
TEWKESBURY ..	5,500	11	3	..	1	1	..	1	..	1	..	..	..	..	..	..	1	..	..	1	2	24.3	6.6	2.2	0.0	W. Allard.
TIVERTON† ..	10,400	24	9	2	..	2	..	2	3	2	..	..	..	..	..	..	2	5	1	..	2	30.1	11.3	2.5	6.3	J. P. McNeill, M.D.
TORQUAY† ..	26,000	*	30	14	2	..	2	4	9	8	..	..	..	..	..	..	8	1	2	..	..	*	15.0	4.0	0.5	P. Q. Karkeek.
TOTTENHAM‡ ..	37,000	163	77	32	15	3	4	12	11	18	..	..	2	1	1	1	13	5	8	..	1	45.9	21.7	5.1	1.4	C. T. Conolly.
TOXTETH PARK† ..	8,000	20	14	4	..	..	1	2	7	3	..	..	..	..	..	..	3	2	2	..	..	32.6	22.8	4.9	3.3	J. McClelland, M.D.
TREDEGAR ..	18,000	87	30	7	12	1	1	4	5	5	..	1	..	..	1	..	3	4	..	2	4	58.8	20.3	3.4	2.7	G. A. Brown.
TROWBRIDGE† ..	12,000	33	8	3	1	..	..	1	3	1	..	..	..	..	..	..	1	1	..	..	..	35.8	8.7	1.1	1.1	G. C. Taylor, M.D.
TRURO ..	11,000	22	15	6	1	..	3	..	5	4	..	..	..	..	..	1	3	..	3	..	..	24.3	16.6	4.4	0.0	E. Sharp.
TUNSTALL‡ ..	15,500	37	34	16	6	..	2	8	2	13	..	..	2	..	..	2	9	2	4	..	..	24.9	22.9	8.7	1.3	J. P. Edwards.
ULVERSTON ..	11,000	27	16	9	2	..	1	1	3	4	..	1	..	..	..	..	3	1	..	..	1	29.9	17.7	4.4	1.1	A. Thompson, M.D.
WALKER-ON-TYNE ..	8,000	34	21	6	5	2	..	4	4	7	..	..	..	..	..	1	6	..	4	..	..	51.7	31.9	10.6	0.0	H. F. Hurst.
WALLASEY‡ ..	23,000	69	50	20	9	6	3	6	6	19	..	2	..	..	1	..	14	2	1	4	..	31.3	22.7	8.6	0.9	I. Byerley.
WARMINSTER† ..	5,786	15	10	2	1	..	1	3	3	..	..	..	..	..	..	..	..	..	3	..	..	33.8	22.5	0.0	0.0	P. Grubb.
WARRINGTON† ..	40,000	122	75	30	22	2	..	14	7	22	..	2	2	..	..	..	18	11	3	1	5	39.8	24.4	7.2	3.6	G. W. Joseph.
WEDNESBURY† ..	26,000	88	58	19	22	3	4	7	3	26	..	..	7	..	1	1	17	6	3	1	..	35.3	23.3	10.4	2.4	J. C. Garman.
WEST BROMWICH‡ ..	54,000	196	128	49	26	*	1	6	21	45	..	..	3	..	2	4	32	..	..	6	10	37.8	24.7	8.7	0.0	J. Manley.
WEST DERBY ..	33,693	93	50	15	14	2	1	6	12	15	..	2	..	..	..	..	13	8	5	..	1	33.6	18.1	5.4	2.9	W. Carter, M.D.
WESTON-SUPER-MARE ..	14,000	20	26	9	2	2	..	5	8	8	..	..	..	..	..	1	7	..	1	..	2	17.4	22.6	7.0	0.0	C. V. Hitchins.
WEYMOUTH ..	15,269	35	26	10	..	1	2	4	9	5	..	..	..	..	1	..	4	*	5	..	1	27.9	20.7	4.0	*	H. Tizard, M.D.
WIDNES ..	22,000	91	56	23	19	2	1	9	2	27	..	1	..	..	..	..	26	3	4	2	1	50.3	31.0	14.9	1.7	W. Cooper.
WILLENHALL‡ ..	19,300	72	57	22	24	..	1	7	3	28	..	..	9	..	3	..	16	3	2	..	..	38.9	30.8	15.1	1.6	W. H. Hartill.
WITHINGTON† ..	15,000	38	20	7	5	5	..	3	..	13	..	1	..	5	..	2	5	2	..	..	..	33.0	17.4	11.3	1.7	T. C. Railton, M.B.
WOLBOROUGH ..	7,300	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	L. Armstrong.
WOLVERHAMPTON† ..	76,000	180	176	73	28	6	7	28	34	52	..	..	5	..	..	1	46	20	9	4	16	30.9	30.2	8.9	3.4	J. H. Love.
WOMBWELL‡ ..	7,500	28	19	6	10	2	..	1	..	5	..	..	1	..	1	..	3	5	1	..	..	38.9	26.4	7.0	7.0	J. N. Millar, M.B.
WORKINGTON† ..	10,000	48	28	4	10	3	2	3	6	8	..	..	1	..	1	..	4	2	2	1	..	58.4	34.1	9.7	1.2	J. Ward, M.D.
WORTHING ..	9,340	20	17	7	2	1	1	4	3	4	..	..	..	1	..	1	3	..	3	..	..	23.5	21.7	5.1	0.0	C. Kelly, M.D.
YORK ..	46,850	142	138	54	31	1	6	25	21	63	..	..	..	..	..	1	60	8	7	1	1	36.9	35.8	16.4	2.1	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

§ The death rate, exclusive of the deaths of non-resident visitors, was 20.1.

1,000, against 18.7 in August; and the zymotic death-rate, which had been equal to 5.7 in August, declined to 4.5 per 1,000, although it slightly exceeded that which prevailed in inner or registration London, where the rates from all causes, and from the seven zymotic diseases were, as before stated, 20.2 and 4.3 per 1,000, respectively.

In the accompanying table we are enabled, through the valuable co-operation of the Medical Officers of Health, to publish uniform September mortality statistics for 198 urban sanitary districts. During the fourteen preceding months the number of contributing sanitary districts had steadily increased from 36 to 192. On the last day of September 223 post-cards were sent out to the Medical Officers of Health of as many urban sanitary districts, including twenty-five first invitations to contribute. Of these 223 cards, no less than 198 have been returned, and the statistical information, thereon furnished, is herewith published. The estimated population of the 198 sanitary districts for which we publish September statistics in the accompanying table is nearly seven and a half millions of persons; and including London and its outer ring of suburban districts, the aggregate population here dealt with is little short of twelve millions, and nearly half the entire population of England and Wales. The birth-rate in those districts furnishing the information averaged 34.6 per 1000, against 37.7, 34.8, and 34.7 in the three preceding months. The birth-rate in July showed a marked drop from the June rate, and this decline was fully maintained during August and September, from which it may be inferred that the number of conceptions in October 1879 were markedly less numerous than in September, and that their proportion remained almost stationary during November and December. Our series of monthly birth statistics will help to throw additional light upon seasonal conception in England and Wales. Exceptionally low birth-rates (under 23 per 1000) prevailed last month in Barnsley, Harborne, Weston-super-Mare, Stourbridge, Southport, Neath, and Coventry. Excessively high rates on the other hand (over 50 per 1000) were returned in the following districts, suggesting in many of them the probability of an under-estimate of the present population:—Widnes, Walker-on-Tyne, Morley, Bisley, Bromsgrove, Tredegar, Workington, Selby, Brentford, Audenshaw, Bradford (Lancashire) and Mexborough.

The annual death-rate during September in the 198 urban sanitary districts averaged 26.2 per 1,000 of the estimated population, showing a further increase upon the rates that prevailed in the three preceding months, which were 18.9, 18.7 and 24.4, respectively. The average death-rate during last month in the twenty large towns, including London, was, as before stated, only 24.1 per 1,000; the rate during last month in the smaller towns showed therefore a considerable excess, mainly the result of greater diarrhœa fatality. Very low death-rates (under 11 per 1,000) prevailed during September in Tewkesbury, Trowbridge, Evesham, Altrincham, Bridport, and Bromsgrove. The death-rate, on the other hand, showed a marked access, and was 35 per 1,000 and upwards in the following towns:—Redruth, Romsey, Sunderland, Ipswich, York, Preston, Middlesbrough, Lincoln, Fenton, Bradford (Lancashire), Ashton-under-Lyne, Morley, and Tamworth. With but few exceptions, these excessive death-rates were due to exceptional diarrhœa fatality. The annual death-rate from the seven principal zymotic diseases in the 198 sanitary districts, averaged 8.7 per 1,000, against 2.6, 3.4, and 7.8 in the three preceding months, and was but little below the average rate in the nineteen large provincial towns. Diarrhœa caused 6.7 of the 8.7 per 1,000 which was due to the seven zymotic diseases; the rate from the remaining six zymotic diseases did not, therefore, exceed 2.0 per 1,000, and was exceptionally low. In seven of the 198 sanitary districts no death was referred to any of these seven zymotic diseases, whereas the zymotic death-rate showed a marked excess, and was above 15 per 1,000 in Audenshaw, Belgrave, Burslem, Bury St. Edmunds, Droylsden, Goole, Gorton, Ipswich, Leicester, Lincoln, Norwich, Preston, Romsey, Selby, Tamworth, Willenhall, and York. The actual highest recorded rates from these diseases were 20.3 in Lincoln, and 21.6 in Preston.

The annual death-rate from diarrhœa during September, which averaged 5.0 per 1,000 in the twenty large towns, including London, was equal to 6.0 in the 179 smaller urban sanitary districts contributing statistics to our table. Diarrhœa was therefore proportionally most fatal in the smaller towns, and showed exceptionally high rates, exceeding 12 per 1,000, in Audenshaw, Bradford (Lancashire), Barnsley, Burslem, Bury St. Edmunds, Goole, Gorton, Heywood, Ipswich, Leigh, Lincoln, Preston, Romsey, Selby, Widnes, and York. We have seen that the highest death-rates from diarrhœa in the twenty large towns were 11.6 and 14.3 in Hull and Leicester; the highest rates, however, among the smaller towns, were 15 per 1000 in York, 16 in Gorton and Ipswich, 17 in Selby, 18 in Lincoln, and 19 in Preston. Only 4 fatal cases of small-pox were registered during September among the seven and a half millions of persons living in the 198 urban sanitary districts dealt with in our table; of these, 2 occurred in Batley, and 1 each in Bury and Liverpool. Measles was somewhat fatally prevalent in Derby, Merthyr Tydfil, and Middlesbrough. Scarlet fever showed considerable proportional fatality in Bolton, Colchester, Leamington, Neath, Preston, Rawmarsh, Wednesbury, and Willenhall. Diphtheria caused 4 deaths in Aston Manor (near Birmingham), 2 in Bethesda, 2 in Chelmsford, and 5 in Withington. Whooping-cough was, for the season, exceptionally fatal in Barrow-in-Furness, Burslem, and Rawmarsh. The deaths referred to fever (principally enteric) showed a considerable increase upon the number in recent months; they were proportionately most numerous in Bootle-cum-Linacre, Burton-upon-Trent, Carlisle, Cleckheaton, Ilkeston, and Leigh.

The annual death-rate from diseases of the respiratory organs, excluding phthisis, averaged 2.5 per 1,000 persons living in those sanitary districts for which the information is available, against 3.6, 2.7, and 2.3 in the three preceding months. The rate from these diseases, however, exceeded 6 per 1,000 in Peterborough, Tiverton, Oxford, Fenton, Wombwell, Middlesbrough, and Lytham. The population of several of these districts is, however, too small to yield trustworthy monthly rates for comparative purposes. It may be noted, however, that the death-rate from these diseases in Lytham also showed a marked excess in August.

Infant mortality, measured by the proportion of deaths under one year to births registered, showed a further marked increase last month, due to the greater fatality of diarrhœa; it averaged no less than 290 per 1,000 (against 276 in August) in those of the urban sanitary districts for which the information is available. In the twenty large towns the death-rate

of infants averaged 246 per 1,000, against proportions of 190 and 276 in the two preceding months. Infant mortality during September was equal to 189 per 1,000 in London; in the nineteen large provincial towns, however, the proportion averaged 300, and ranged from 172 and 251 in Bristol and Oldham to 348 in Norwich, 352 in Salford, 414 in Hull, and 451 in Leicester. Among the smaller urban sanitary districts infant mortality showed the largest proportional excess in Ashton-under-Lyne, Aston Manor, Burslem, Bury St. Edmunds, Canterbury, Cheltenham, Fenton, Gorton, Ipswich, Lincoln, Liversedge, Luton, Middlesbrough, Preston, and York. In Preston and York the proportion of infant mortality was so high as 482 and 380 respectively, against 412 and 418 in August.

Our table of September statistics includes the following fifteen watering places or health resorts:—Bangor, Brighton, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The usual return from Dawlish had not come to hand when we went to press. The annual death-rate in these fifteen watering places during September averaged 22.8 per 1,000, against 20.3 in August; the zymotic death-rate was equal to 4.9, and was only slightly below the rate (5.0) that prevailed in August. This excess of the zymotic death-rate was again mainly due to diarrhœa fatality. The death-rate from diseases of the respiratory organs during September in these watering places, exclusive of Brighton, for which we do not yet receive this information, did not exceed 1.6 per 1,000, while it averaged 2.5 in all the sanitary districts. These facts afford, on the whole, evidence of the satisfactory sanitary condition of these fifteen favourite health resorts.

Our thanks are again due to those Medical Officers of Health whose co-operation renders possible the publication of our monthly table of uniform mortality statistics. Our contributors this month include several who have furnished (in reply to invitations) their cards of statistics for the first time, we have, moreover, received several promises of future assistance. We have reason to hope, therefore, for a further extension of our table, which has already grown so steadily during the past fourteen months. It is very satisfactory to be able to note that of our 198 previous contributors, only 14 failed to send their cards in time for publication. We may note that 74 of the 198 cards of statistics were received on or before the 5th October, thus considerably facilitating the labour of preparing our table for publication; to these Medical Officers of Health our thanks are especially due. On the 7th inst. we posted 39 reminders, because that number of the cards sent out had not been returned up to that day. Considering how large a number of Medical Officers of Health are busily engaged in practice, the regularity and punctuality with which we receive the monthly cards is, however, as satisfactory as it is surprising.

Dr. Alexander G. Young has been appointed Medical Officer, Public Vaccinator, etc., for the Mountmorris Dispensary District of the Newry Union, at £120 per annum and fees, and £15 per annum as Medical Officer of Health, and Medical Attendant to the Royal Irish Constabulary at Mountmorris and Baleek, *vice* Pratt, deceased. Arthur Pearce, M.R.C.S. England, L.S.A. London, has been appointed Medical Officer of Health for the Salcombe Urban Sanitary District, Devonshire, for five years.

SPECIAL REPORTS.

THE INDUSTRIAL AND ART EXHIBITION, AT MANCHESTER.

AN Industrial and Art Exhibition, under the auspices of the recently formed Industrial Exhibition Company, Limited, was opened on September 1st, at the Agricultural Hall, Manchester. The plan of the building is nearly square, measuring 96 yards by 102, so that the covered area is appreciably over two acres. This space was allotted to about 250 exhibitors. As a mere commercial speculation the exhibition deserved success, for it would have been impossible for anyone of average intelligence to spend a few hours there without profiting by his visit. The department of the exhibition which was most prominent was the machinery in motion; but the department in which the Company doubtless felt that they were 'strongest', was that devoted to gas appliances. Indeed, the Gas Committee of the Manchester Corporation having offered silver medals for excellence in manufacture of such appliances and for novelties, the entries in this section were very numerous, and the display was creditable to everyone concerned in its production. The fitness of gas for cooking purposes was demonstrated daily at several gas stoves and ranges, and lectures on cookery with modern gas appliances were delivered by a competent teacher every afternoon. It may be mentioned also that in order to facilitate the judging of burners, etc., the corporation kindly lent two of their standard Letheby-Bunsen photometers, and the method of using those beautiful instruments was explained to all comers.

The department of domestic and sanitary appliances was so large, and embraced so many useful and ingenious contrivances, it would be impossible to do justice to it in the limits of a short notice. However, we have done our best to note down such of the exhibits in this department as appeared to us worthy of special attention. We observe no particular order, but follow the numbers in the catalogue.

23. JOHN HARPER AND CO. (Willenhall) exhibit a great variety of so-called 'American novelties'—for the most part' consisting of malleable iron castings. We noticed especially a patent fire-lighter, consisting of an iron cell packed with asbestos, at the end of a long iron handle. A spoonful of mineral oil is poured on the asbestos, and the cell thrust into the grate; and thus a fire is lighted in a few minutes without the aid of wood or paper. These fire-lighters are retailed at one-shilling.

24. JAMES SINCLAIR (Manchester). This is a large stand containing a fair show of fire-engines, hydrants, hand-pumps, valves, etc. We noticed a good smoke respirator fitted with Tyndall's Filter, and a combined respirator with this filter and an air tube, also a dust respirator for grinders and wool-sorters.

24F. ALLAN STEAM SHIP COMPANY (Liverpool). Hammock and cot, etc., in use for emigrants, and bed stuffed with cork shavings (A. Wood's patent), convertible into a life-saving apparatus.

26. HINDE AND SON (Birmingham). Brushes for toilet purposes and for horses. The bristles are of metal and are set in a convex india-rubber bed.

35C. W. H. HILTON (London) exhibits many American domestic appliances for saving time and labour. We were particularly struck with a very simple form of meat cooler. It is an ordinary meat cover turned up at the rim all round, so as to form a groove an inch wide by an inch deep. This is filled with water, and a flannel jacket is drawn over the cover, the border of the jacket dipping into the groove.

40. CHORLTON AND DUGDALE (Manchester) have a good exhibit of their spring mattresses, invalid couches and bed-rests. Our attention was drawn to a simple form of pillow divider for double beds, made, we believe, at the suggestion of Dr. Richardson.

40C. SLATER AND CO. (Oldham) show an ingenious draught and dust stopper for fitting to the bottom of doors. On the door being opened the stopper does not drag, but lifts itself at once. The same firm show a slow combustion stove, fed from the top, which is said to burn only from 8 to 12 lbs. of coal in 24 hours.

47. T. E. RIGBY (Manchester) shows a stall full of goods made from a form of vulcanite, produced out of refuse cotton and glycerine. The material appears to us to be well fitted for tap washers, pneumatic tubes, chair seats, etc., and doubtless might be utilised in many ways not yet tried—surgical splints for instance.

49. J. L. HANCOCK (London, E.), known to visitors to exhibitions as the inventor of a handy bread-crumbling machine, sugar mill, butter purifier, and potato masher, shows a useful bread-making machine. The vessel holding the flour sits in a warm bath, and when the flour is warmed through, German yeast is beaten up in a small separate apparatus (which may also serve as an egg whisk), and added. The little kneading required is done without the hands of the breadmaker touching the dough, and a fine light sponge is produced in a wonderfully short time.

68. L. BROOK (Lower Broughton), exhibits a neat little vent peg, with a central perforation closed by valve.

74. B. HARLOW (Macclesfield) is represented by a large exhibit. A domestic filter drew our attention, owing to its being *cleansable*—a somewhat rare advantage. The part containing the unfiltered water can be lifted out, and the whole of the filtering medium turned over or changed in a minute.

77. J. BEGG AND CO. (Bolton) have on view and taste a large assortment of effervescing drinks of a non-intoxicating kind.

78A. JEWSBURY AND BROWN (Manchester) show treble aërated soda water, potash waters of various strengths, and samples of all the favourite British and foreign mineral waters. We especially noticed an aërated solution of quinine, delicately flavoured, and forming a very palatable glass of bitters.

97. H. CROSSE (Tower Hill, London) has a stand of his well-known lime-juice preparations. Some, sweetened and flavoured, make very pleasant beverages, others for shipping are of concentrated strength. All are good wholesome articles.

104. THE SANITARY APPLIANCE COMPANY (Salford) have sent some well-contrived cinder sifting ash closets, earth commodes, etc.

112. W. AND A. C. RUSSELL AND CO. (Pendleton) exhibit a large variety of Manchester-made castings. We noticed in particular some capital park-seats, with backs made really to rest the back, and foot-boards to fold up in the evening. The ordinary foot-rests of park seats are usually so saturated with dirt and wet as to be no use at all.

209. T. S. WATHEN (Birmingham) shows an ingenious flexible button, that can be put on instantly without sewing. We commend the invention to the attention of bachelors and others.

218. T. WOLSTENCROFT (Manchester) shows, among other articles, Major Orrell's knapsack. It is without strap or buckles, and fits over the shoulder supported by a pair of steel springs. The weight is kept well in the right position, there is no undue pressure anywhere, and the sack can be taken off and resumed in a few seconds.

As washing and wringing machines come within the description of domestic and sanitary appliances, we must not forget to mention that these useful articles are well represented. We, however, saw nothing to beat the well-known machines of Messrs. BRADFORD AND CO. (Vowel machine, 40B), Messrs. THOMAS AND TAYLOR (170), and Messrs. WOOLFALL AND BRINDLE (170). All these have been in the market many years, and their merits are too well known to need any commendation.

CONFERENCE OF MUNICIPAL AND SANITARY ENGINEERS AT DARLINGTON.

ON the 24th ult. the first Conference of the recently formed Northern District Branch of the Association of Municipal and Sanitary Engineers and Surveyors was held in the Council Chamber, Town Buildings, Darlington. Mr. A. W. Morant, Borough Engineer, Leeds, and President of the General Association, occupied the chair. Mr. P. W. Thompson, C.E., who has taken an active part in the formation of the Branch, was unanimously elected District Secretary. There was a good attendance of Delegates from the Northern Counties, and it was agreed that the boundaries of the District should not be fixed by any hard and fast line. Mr. Craggs, of Shildon, read an interesting paper on his 'Plan for the Disposal of Sewage', which is now being carried out by the Shildon and East Thickley Local Board. After some discussion the thanks of the meeting were accorded to Mr. Craggs for his paper. Mr. Geo. Bell, Surveyor to the Felling Local Board, submitted a paper on 'Sanitary Appliances'. He said that, having experienced considerable difficulty in meeting with a satisfactory method of disposing of the refuse of his district, he now adopted the self-acting water-closet and dry ash-pit combined, which had been designed and patented by Mr. A. M. Fowler, Borough Engineer, Newcastle-on-Tyne, which in every case had given great satisfaction. Mr. Hall, of South Shields, said he had adopted the same plan in his district, and he found it answered admirably. Mr. R. Sawser, of Manchester, deprecated, and Mr. Spencer, North Shields, defended, the tub system, and after further testimony of the efficacy of Mr. Fowler's plan had been given, a vote of thanks was cordially awarded to Mr. Bell for his paper.

During the course of the day the company visited the Darlington Corporation Sewage Farm, under the guidance of Mr. T. Smith, the Borough Surveyor, who fully explained the engineering features of the scheme. At present the farm covers about 225 acres, but at the end of the year 90 additional acres will be joined to it. At the present time about 1,153,000 gallons of sewage are dealt with every twenty-four hours. The farm just clears its expenses; whilst the system adopted relieves the town of a great nuisance, which had previously involved the Corporation in Chancery proceedings. The party also visited the works of the Stockton and Middlesborough Water Company at Tees Grange, which is situate about two-and-a-half miles from Darlington, the works being about forty-seven miles equidistant from the source and mouth of the Tees. Mr. Simpson, Secretary of the Board, conducted the party over the works, which cover eighteen acres, the company also occupying the nine acres adjoining. About fifty millions of gallons per week are pumped from this source for both domestic and manufacturing purposes. It is expected that the next meeting of the Association will be held at Stockton-on-Tees.

UNITED KINGDOM COFFEE TAVERNS COMPANY (LIMITED).

WE have more than once expressed our sense of the great usefulness of enterprises of this sort, and we see that the United Kingdom Coffee Taverns Company is just now active in opening new houses, and has this week, we are informed, signed agreements for taking premises for two more Taverns, one in the centre of Deptford, a most conspicuous house in the Broadway, surrounded by public-houses, and a dense working-

class population; the other premises are in High Street, Hounslow, and are also very suitable. Everything depends, for the success of such houses, upon the selection of thoroughly suitable sites, and upon careful and economical management. This Company appears to be giving great attention to the selection of sites in good thoroughfares and thickly-populated working-class neighbourhoods, and it is under such conditions that Coffee Taverns thrive. Many of these enterprises have been able to return good and even large dividends, from 7½ up to 10 and 15 per cent., to their shareholders, who are, of course, in the majority of cases, well content with a 5 per cent. dividend from enterprises which are in themselves so useful and philanthropic. The business management of the United Kingdom Coffee Taverns Company (Limited) appear to be fully alive to the importance of considering thoroughly business principles in the selection of sites and of management, and its observance of this mode of action gives the best hope of good financial returns on the funds invested. Of the usefulness of the enterprise there cannot be a second opinion, and we honestly wish to this Company, as to all the other Companies of like character, continued and sound success, and that they may find a large and active body of shareholders willing to supply the funds for, and take personal interest in, the business prosperity of the undertaking.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

'NATURE'S HYGIENE.'

After a careful perusal of the review of my new work which appeared in your September number, I feel bound to claim your indulgence for a little space, in which to offer a few observations upon some points referred to, and raised by the reviewer.

In the first place, I am charged with drawing no distinction between fungi and bacteria. This charge is scarcely warranted, since, in the words cited by the reviewer, I am only referring to a statement made by Dr. Drysdale upon the authority of Naegeli, and, indeed, this is expressly intimated in a foot-note on page 72 of my book. It will be seen that in a number of places (for instance on page 154) some distinctions between fungi and bacteria are intentionally remarked. Next, I am stated to have overlooked the experiments of Chauveau, Braidwood, and Vacher. This statement is also incorrect. On page 74 I give a reference to the 'Reports on the Life History of Contagion', and in several places I have laid stress upon the observations of Burdon-Sanderson and Panum in reference to the *particulate* nature of the contagia. Thus, I refer to Dr. Burdon-Sanderson's papers in various 'Reports of the Medical Officer of the Privy Council' (pp. 62 and 67) again and again, and one may fairly say that these papers are very largely taken up with the experiments of Chauveau.* Moreover, if these experiments prove anything, they prove the *particulate* nature of the contagia experimented with, and I apprehend that this result has taken its place among the facts accepted by all who take an interest in the subject. As to the germ theory of disease, I give all due weight to the work of Obermeier, Pollender, Cohn, Koch, Klein and others, and readily give in my adhesion to this theory so far as it is *not* a theory, that is to say, so far as it rests upon experimental evidence; but further than this I cannot go, and do not intend to go, unless such other evidence of its truth may be forthcoming as is wanted, and admitted, too, to be wanted, even by those who have pledged their faith most strongly in this theory. I should be among the first to rejoice over the acquisition of any new knowledge of the causes and nature of communicable diseases; at the same time, I recognise to day certain very serious difficulties in the way of the germ theory, 'as now generally accepted', and, so far as the use of facts and logic enable me to judge, I believe the doctrine of *contagium virum* is often wrongly applied. As to how we are to differentiate degraded forms of bioplasm, organised though they be, from disease-germs so-called, I would reply at first blush, by the fact that they are *organised* but not *organisms*. There can surely be no great difficulty in recognising, say, the fact that sepsin is not a disease germ or an organism. There is an enormous difficulty, however, in arriving at a satisfactory conclusion as to the nature, for instance, of the contagium of splenic fever. While the investigations of Pollender, Davaine, and Klebs point to the so-called *bacillus anthracis* as the true virus of this disease, the novel experiments of P. Bert (*Compt. Rend.* 84, 1877, 1,130) point to an entirely different conclusion, viz., that the bacterium in question has nothing essentially to do with splenic fever, and that the true course is to be found in a shapeless non-organised ferment or poison.

Further on in the review there is a remark which makes it appear that I claim all the virtues of the eucalyptus for peroxide of hydrogen (and, it should be added, the other chemical compounds which are associated with it). Not at all. On page 127 of my work, I admit the value of 'the drainage power of the trees', but it is only the chemical work, that I have instituted and carried on, which explains the *peculiar* effects of the eucalyptus tree under given circumstances. The drainage power is not sufficient explanation, for if it were, then the eucalyptus tree would not exhibit any positive influence on the health of a neighbourhood, and moreover, in such case, it could be replaced by other trees.

Leaving Dr. Day of Geelong to defend the position he has assumed, I pass on to the concluding paragraph of the review. I protest very strongly against the use of the expression 'meagre' in relation to the experiments I have conducted with Sanitas. For more than six years, I have been almost continuously engaged in the study of the antiseptic and (from my point of view) disinfecting characters of this product and its various constitutents; and while I grow more convinced that my earliest statements were quite correct, experience at large has happily proved the same thing and justified my claim. To ascertain the effects of circumstances upon bacteria and other ferments I have not used the microscope, because I am not skilled in its use; also because some of those who are most skilled in its use have been fearfully misled by microscopic appearances, and especially in connection with the germ theory of disease; and, lastly, I have not used the microscope because, while distinctly admitting the aid it lends to research, my own special science affords me better and more exact methods. Given a knowledge of the habits and modes of decomposition excited by bacteria in various media, I am content to ascertain the extent to which those habits and modes of decomposition are interfered with by 'Sanitas'. If the habits be no longer exhibited, or if the decompositions be arrested, I infer that the ferments or microphytes have been

* This is particularly the case with Dr. Burdon-Sanderson's paper, contributed to the 'Thirteenth Report of the Medical Officer of the Privy Council'.

either rendered inactive or killed, and if the microscope tells another tale, I would no longer rely upon that instrument. I depend, however, not upon my reviewer's qualitative and ill-defined experiment with linseed meal, which, as reported, is of no scientific value, but upon my own published researches and those of many others.

The true meaning of the term disinfectant may be difficult to render. It all depends upon the essentials of that which requires *disinfecting*, and what is that? Is it the bacterium which performed excursions in the extract of linseed meal? I use the word disinfectant to describe a reagent which will prevent putrefactive decomposition, or will arrest it if already initiated, and oxidise the products of that process; which will keep the discharges from wounds healthy, and tend generally to keep one's surroundings in a healthful and pure state, and the name of one such reagent is 'Sanitas'. He who admits the germicidal power of Thymol and allied compounds, cannot deny it, because these substances happen to be present in Sanitas, and he who admits the value of oxygen as presented in the solution of a permanganate, must grant it when presented in the form of peroxide of hydrogen. Again, if ærobies are destroyed by germicidal substances, and if anærobies cannot sustain the action of oxygen, then 'Sanitas' is a perfect disinfectant according to Pasteur's own definition.

C. T. KINGZETT.

WOOD PAVEMENT.

It is impossible to drive through London at present without being struck with the enormous amount of wood pavement that is being laid down, and without asking oneself, 'Is it good from a sanitary point of view?' It appears to me that the vestries are rushing at it without adequate consideration, tempted by the large saving in scavenging which it renders possible. It is being laid down in half-a-dozen different ways, and if one of them is right, the others must be wrong. In Piccadilly the blocks appear to be creosoted before they are brought upon the ground, and asphalte is used in laying them besides. Further on, on the same line of road, in Kensington High Street, the blocks are not creosoted, and I do not think asphalte is used in laying them. If the creosoting is unnecessary, it seems a pity to waste money upon it, and if it is necessary, why is it omitted in some places? My own belief is that it is necessary. Captain Douglas Galton states, in his book on *Healthy Dwellings*, that the wood pavement which was laid down long ago in Regent Street had to be taken up because it became so saturated with horse-dung that it gave off such an amount of foul gas as to render it impossible for the silversmiths to keep their goods bright. It is possible that saturating the blocks with creosote will prevent this, but what will be the result in the place where they are not treated with creosote or anything else? Again, how will the wood pavement behave in the event of a great fire? Creosoted wood does not burn very freely, but it gives off an amount of stifling smoke which would make it impossible to remain in the street if it took fire. What will be the effect if a gas-pipe or a water-pipe bursts underneath this wood pavement? The vestries, or their contractors, seem to differ a good deal in their views as to the proper amount of concrete to lay underneath it, but in some places I have seen them laying as much as eighteen inches of solid cement concrete. This makes a most excellent road, doubtless—practically, a concrete road with a skin of wood to protect it—but such a road should have a subway underneath it for the gas and water-pipes, or trouble will certainly arise. If a water-pipe with a high pressure upon it were to burst under this amount of concrete, would not the water force its way into the basements of the houses before it found a vent through the concrete? I do not wish it for a moment to be supposed that I disapprove of wood pavement, but I think that the best method of laying it requires more consideration than it has received, and if you will open your columns to a little discussion upon the subject, much good may arise from it.

COSMO INNES, M.I.C.E.

7, John Street, Adelphi.

TEXT-BOOKS OF SANITARY SCIENCE.

You would very much oblige me if you would give me the titles and prices of any works useful for reference, and for the guidance and assistance of a surveyor to a Rural Sanitary Authority.

A SANITARY INSPECTOR.

[Baily Denton's and Baldwin Latham's *Sanitary Engineering* (E. F. and N. Spon), C. Slagg's *Rural Sanitary Work* (Crosby Lockwood and Co.), Dr. Edward Smith's *Hand-book for Inspectors of Nuisances*, Joseph Robinson's *Sanitary Inspector's Practical Guide, Suggestions for Sanitary Inspectors*, issued by the Local Government Board, *Structural Sanitary Work*, by John S. Hodgson, C.E. (SANITARY RECORD, July 15th, 1880), Robinson and Melliss's *Purification of Water-Carried Sewage* (Smith, Elder, and Co.), W. P. Buchan's *Plumbing* (Crosby Lockwood and Co.), Marsh's *Handbook of Rural Sanitary Science* (Smith, Elder, and Co.), Law and Clark's *Construction of Roads and Streets* (Crosby Lockwood and Co.]

POLE'S SYPHON WATER-CLOSETS.

I see from the correspondence on the above in the SANITARY RECORD for September, that several writers have not fully understood the description given in your August number. I refer these gentlemen to a letter on page 117, dated September 8th, signed 'George Foulkes', which gives a full description of this closet in Mr. Pole's own words.

One of your correspondents observes that a quantity of water dashed into a 'Pole' closet untraps the syphon. This remark, which is quite correct, applies to many other closets subjected to the same treatment, and it is to prevent this that the can, used with the 'Pole' closet, is recommended. By a simple arrangement, described in the SANITARY RECORD for August 15th, this can retains a sufficient quantity of water to recharge the syphon immediately after the flush has been instantaneously delivered into the pan, and so prevents the return of sewage gas.

I wish it to be understood that the syphon referred to is the only trap between the closet and the main sewer. There should be no second trap of any kind, as gas generated between two traps may have sufficient pressure to force its way into the house closet the instant a lever is raised or water poured in. This remark applies to most closets.

Many of the attempts to ventilate closets are fraught with more evil than good. If the sewer gratings are sufficiently large and numerous to prevent gas accumulations, the less the soil pipes are meddled with the better.

Allow me to repeat that I strongly object to large amounts of objectionable matter being turned into sewers; but, so long as Medical Officers of Health

insist upon this as imperative, all I aim at is to accomplish this in the least dangerous and offensive way. I consider the whole system a great error.

WM. BENNETT.

A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

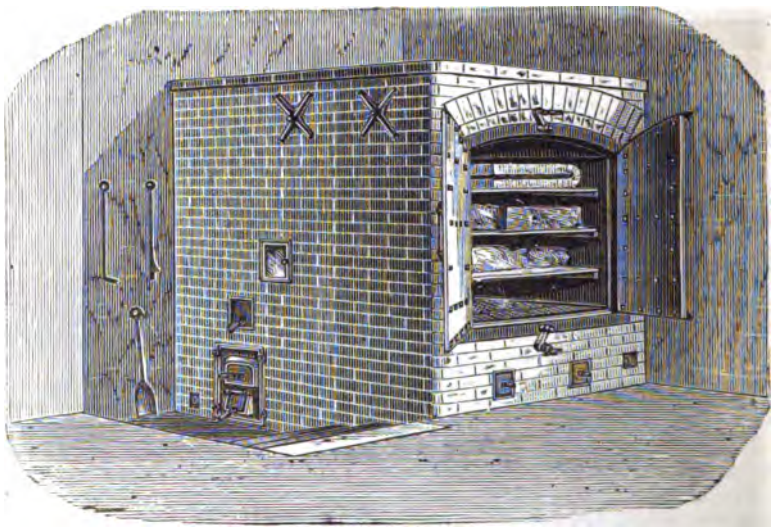
(*Continued from p.* 91.)

AIR.—XXXV.

Disinfection by hot air.—It is now customary in all properly equipped hospitals to subject clothing, bedding, mattresses, and other articles to the action of heated air, in order to destroy any germs of disease which may lurk there, and the practice is also carried out in many of our larger schools, and even private residences. The articles are mostly disinfected in close chambers, in which heated air is made to pass, and in the majority of cases until a temperature, ranging between 250° to 300° Fahrenheit, has searched every portion of the fabrics which have been placed there.

The Fraser disinfecting chamber apparatus, which I will first describe, is generally built of brick and the chamber arched over, apertures being left here and there for the passage of impure and noxious vapours to be led into flues, and from thence into the fire to be totally consumed. It can be erected in any convenient part of the basement, and can be got in working order almost immediately after the fire has been lighted. The clothes or bedding are brought direct to the chamber and subjected to the necessary heat, the intensity of which is shown by a pyrometer, and if it be wished, the air may be impregnated with sulphur, by burning that substance on the small grating allotted for the purpose. The air after passing through the clothes is led, as was mentioned, through a fire before being led to the chimney-shaft, and therefore all vapours given off are thoroughly destroyed by that element. After remaining for an hour or two the clothes may be removed, and will be found free from power to infect.

In the ordinary arrangement the articles requiring disinfection are placed upon trays or racks in order to separate one layer from another, and the heated air which passes over the hot plate enters through



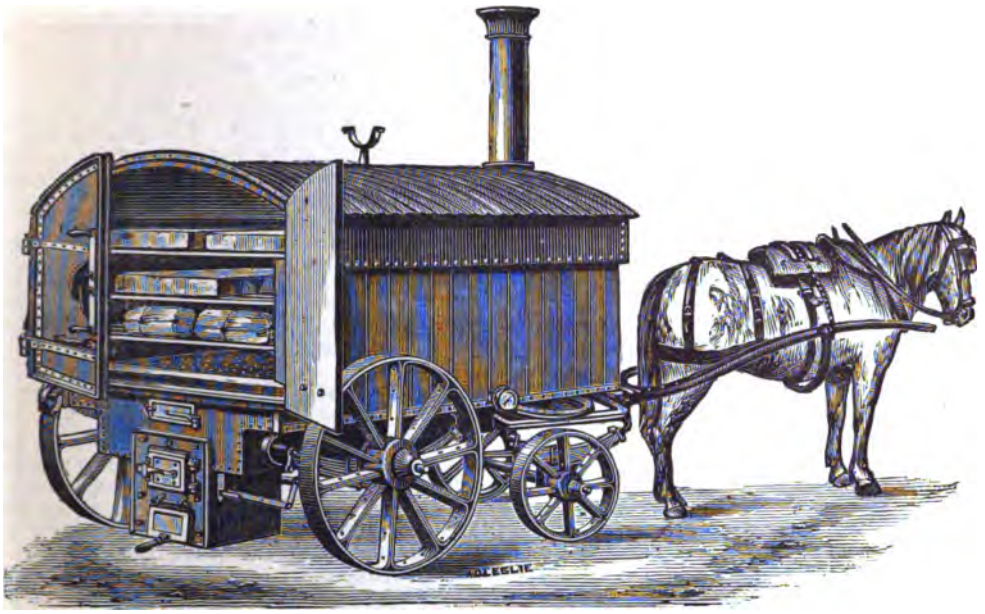
FRASER'S FIXED DISINFECTING CHAMBER, FOR HOSPITALS, SCHOOLS, ETC.

the bottom layer and then up through the whole series to an outlet provided at the top; after which it passes down a flue formed in the chamber, and enters the fire to be purged of its vapours. In some cases, water is placed upon the hot plate in order that the heated air may become more impregnated with moisture.

In some cases the doors of the chamber can be opened for the admission of a truck containing the clothes to be disinfected, and this is a great consideration, as the articles can be purified without the slightest danger to health. The infected articles in large districts and parishes can thus be collected in an iron carriage, taken to the chamber, which would be erected on some convenient central site, disinfected by the sulphur-charged hot air, and returned to their owners without having been handled or removed from the truck. Some dozen or so of the above kind of apparatus are in use in London alone, and from the peculiar construction of the chamber they can be erected in the most densely crowded neighbourhood without danger.

I have erected one for use in a London hospital, tested it repeatedly, and found it easy of management, and the cost of working very inconsiderable. There are different opinions as to the degrees of heat required to destroy malignant germs, but the experience of Messrs. Fraser, of London, the engineers and manufacturers of this system, is that infection has never been known to follow anything which has been properly and thoroughly subjected to a heat of 212° or a little over. Some, however, prefer a much higher degree of heat, and hence the apparatus is made capable of accommodating a temperature as high as 300°.

This method of disinfection has been so much approved, that during the last year or two it has been arranged in a portable fashion suitable for country places or for use in camps. The apparatus, complete, and ready for use, can thus be drawn to the infected district, and the clothing or bedding disinfected upon the spot. The van is simply brought to a standstill at the door of the house, the fire in the small furnace underneath lighted, and the tem-



FRASER'S PERAMBULATORY DISINFECTING APPARATUS.

perature of the chamber quickly raised to the required height. The articles to be disinfected are then placed inside, the door closed, the sulphur lighted, and in from one to two hours their purification is as complete as the depurating power of heated air can effect it. There is no risk even from the shortness of the chimney, inasmuch as the whole of the fumes given off are passed at once through the furnace and destroyed.

SANITARY INVENTIONS.

HORSFORD'S ACID PHOSPHATE.

This mixture of acid phosphates has been introduced into this country by Messrs. McDougall Brothers, of London and Manchester, with a view of utilising, in the form of a beverage, the recognised valuable properties of these salts, which possess distinct digestive and therapeutic influences, if used as an adjunct to our daily food. The manner in which acid phosphate first attracted notice in the United States is favourable to this view of its utility. It had, it appears, been noticed for some time that a form of liquid acid phosphate employed as a constituent in the manufacture of other phosphatic preparations, was largely used by the workmen and their families as a medicinal agent, and that in cases of fatigue or exhaustion it was found to be restorative to a marked extent. This fact Professor Horsford brought under the notice of the medical men of the neighbourhood, who have since prescribed this acid phosphate liquor with marked success. Some of the most eminent therapeutists of the States having been then consulted, 'Horsford's Acid Phosphate' was placed before the medical world and the general public of America, with results which amply justify its introduction into this country. The preparation is much used in the States in the way to which we have referred as a daily drink, mixed with sugar and water, while it forms a most refreshing addition to the contents of the *gazogène*, or to any of the simpler aërated waters; and according to reliable American medical testimony, it is partaken of with considerable advantage by persons suffering from nervous disorders, or necessarily exposed to the exhausting effects of protracted mental labour. As a medicine, it is reliably recommended for dyspepsia, nervous exhaustion, and wakefulness, and for preventing or alleviating sea-sickness. Its medicinal powers are now being tested in twenty-four of our metropolitan hospitals; it is however with its value as a dietetic that we are chiefly concerned.

HOT-WATER OPEN FIRE-GRATE.

Messrs. Potter and Sons, 298, Oxford Street, have brought under our notice an extremely ingenious and very useful fire-grate, which is so devised as not only to fulfil the purpose of a heating hot-water apparatus for the use of wards, passages, and public buildings of any kind, but to combine the advantage of an open grate, with all its pleasant and cheerful associations, and heating the air of the room by allowing it to pass through its chambers. This apparatus consists of an open fire-grate, surrounded on three sides and at the top by a wrought-iron chamber containing water, which, when warmed by the fire, circulates through upright coils of pipes placed on either side. The hearth is made of iron, and the whole space below the grate and pipes is formed into a chamber for the admission and collection of air from the outside. The outer fresh air thus admitted passes upwards, and, impinging against the sides of the hot-water chamber and pipes, becomes thoroughly heated, without being burnt, before entering the room. We have seen this stove in operation, and very warmly recommend it. It is in work at several public institutions, of which the addresses can be had of Messrs. Potter.

The following gentlemen have been examined and approved at Cambridge for sanitary science certificates:—A. W. W. Leachman, M.D., W. J. R. Simpson, M.D., G. G. Tatham, M.D., W. H. Weddell, M.R.C.S., and J. W. Williams, F.R.C.S. The examiners were Drs. A. W. Barclay, Arthur Ransome, W. H. Corfield, and Professor de Chaumont, F.R.S.

NOTES ON EPIDEMICS.

[We propose to give from time to time, under this heading, such facts as we can glean from reports of health officers and from other sources as to the etiology and spread of infectious diseases as observed by local investigators. It is highly important to codify these local experiences, but the task has never yet been attempted. We would venture to express a hope that this column may eventually be found of considerable assistance in this regard, and we earnestly invite all medical officers of health to favour us with their experiences. We shall, moreover, be glad to give space, under this heading to discussions on the causation of epidemics, especially of those diseases the origin of which is still obscure.—ED.]

NOTES ON INFANTILE DIARRHŒA.

THE unusual prevalence of diarrhœa during August in Manchester and district is shown by the fact that out of 751 out-patients admitted to the Children's Hospital during the month, 351 were suffering from diarrhœa. With reference to the question of the diet of children under one year being a cause of the disease, I made careful enquiries as to the manner of feeding in forty consecutive cases. Of these, nine had been brought up on the breast only, five on the breast, but being favoured (?) at times with 'tastely' bits from the parents' table, the remaining twenty-six had either had no breast at all, or only at odd times when the mother was at home, and from the first had been fed on boiled bread, biscuits, 'pobs', corn-flour, condensed milk, or milk. These figures bear out the generally received conclusion that, while infantile diarrhœa is especially prone to attack hand-fed children, the breast-fed children do not entirely escape.

Out of a total number of 44 deaths, 33 were due to diarrhœa. Of this number 12 were under 1 year, 18 from 1-5 years, and 2 were 5-15 years old. In one of the fatal cases, a child of 5 years, the attack terminated fatally within 12 hours. The child, apparently in good health, was seized with pain in the abdomen, vomiting, and purging, passing before its death large quantities of pale watery stools. On *post-mortem*, the intestines contained a large quantity of pale mucoid opalescent fluid, and the mucous membrane, both of the stomach and bowels, was in places pink from injection of the capillary vessels. The face was sunken, left ventricle firmly contracted, and the blood in the veins semi-fluid in consistence. The other organs were healthy. In another child, aged two-and-a-half years, who had been ill more or less for three weeks with vomiting and purging, and in whom for the last few days of life the symptoms, especially the vomiting, were very severe, the following condition was found at the autopsy. Stomach contained some altered blood, and there was capillary injection of the mucous membrane. Intestines contained much gas, the mucous membrane was pink from capillary distension, no ulceration, no lesion of Peyer's patches, slight hæmorrhage from congested vessels. The liver somewhat small (7 oz.; body weight 17½ lbs.), pale, evidently very fatty, lobules distinct, central portion light red, outer zone white. The microscope showed the cells distended with fat globules obscuring the nucleus, and at times completely filling the cells; some crystals, apparently leucin, noted. Kidneys normal (no urine obtained during life). Brain and other organs normal. The relation of the state of liver to the condition of the intestines, and to the symptoms during life, is of great interest. Only one case of typhoid fever has been noted during the month. The first week of August was wet, the last three weeks dry, hot, and close.

During September, out of a total of 682 admitted to the out-patient department of the General Hospital for Sick Children, Manchester, 264 were suffering from diarrhœa. The total deaths amounted to 51, of which no less than 43 were due to diarrhœa. Of these, 21 were under one year, and 22 were between one and three years old. The greatest number of deaths occurred in the first week of the month. In September 1879, there was a total of 681 admitted; 100 of these were admitted for diarrhœa, with a total of 32 deaths, 8 from diarrhœa.

HENRY ASHBY, M.D.Lond.,
Physician to the General Hospital for Sick Children, Manchester.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The first meeting of the session will be held at 1, Adam Street, Adelphi, on Friday, the 15th inst., at 7.30 p.m. The minutes of the last meeting will be read. The Council will present a report on the following subjects:—(1) The Census. (2) The continuance of the payment for the collection of samples of the metropolitan waters for analysis; and the publication of the results in the name of the Society. A letter from Dr. Billing, Washington, with a contribution of reports, periodicals, etc. Sir Brydges P. Henniker, Bart., will be balloted for as an honorary member. An Inaugural Address will be delivered by the President (Dr. J. S. Bristowe), to commence at eight o'clock.

SANITARY JOTTINGS.

DISTRIBUTION OF SCARLATINA BY MEANS OF MILK.—Much anxiety has been caused by an extensive outbreak of scarlatina in Paddington, supposed to be due to infected milk supplied by a large private dairy. The question is being rapidly solved. Dr. Broadbent, at whose instigation mainly the matter is being investigated, has been able to trace the infection into about fifty families. His inquiries appear to have conclusively established the fact that the disease has been carried by the milk; it still remained to discover the source of the contagion. Dr. Stevenson, the Medical Officer of Health for Paddington, thinks he has been able to determine this. We hope shortly to be able to place the details of this important outbreak before our readers.

Building Societies and the Parkes Museum.—At a recent meeting of the Directors of the Nineteenth Century Building Society, Mr. George Palmer, M.P., Chairman, it was resolved unanimously that a course of Lectures at the Parkes Museum of Hygiene on House Sanitation would be most valuable to the members of Building Societies, who to a very large extent own the houses they live in. The Secretary of the Society was therefore requested to ask the Committee of the Museum whether such a course of Lectures could not be given gratuitously during the ensuing winter.

Lord Norton writes to a contemporary that he lately heard some future kitchenmaids being prepared for imminent cookery from treatises on 'Domestic Economy' distinguishing carbonaceous from nitrogenous food, and white of egg they were made to call 'halbûmen'.

Autumn diarrhœa is very prevalent amongst the children of the pit villages of Durham and Northumberland.

ORIGINAL PAPERS.

SANITARY NOTES.

By J. Lane Notter, B.A., M.D.,
Surgeon-Major, Army Medical Department; Assistant-Professor of Military Hygiene in the Army Medical School, Netley.

On the Filtration of Potable Water.

III.

In this paper it would obviously be impossible to discuss in detail the many important and interesting questions suggested under this head. My object is to confine my remarks to a very few practical points, and for this purpose I shall have to consider what are the impurities often to be met with in potable waters, what means are at our disposal for recognising them, and how far we are able effectually to get rid of them, or render injurious matter innocuous, and, lastly, what is the effect of the various filtering media and filters now in the market on potable waters.

Water, as delivered by public water companies, should be free from suspended matter, and almost free from colour. If the colour is a decided yellow, it is probably due to iron, and if this is not present it would appear to indicate organic contamination, probably vegetable, possibly animal. The lustre should be bright or adamantine; a dull or vitreous lustre is an unfavourable sign. The taste should be pleasant, and leave no decided sensation in the mouth. There should be no smell, even if the water has been kept in a stoppered bottle and exposed to the light for several days.

Very few towns can congratulate themselves on having such a water-supply, for in the majority of cases they are limited in their choice as to the source from which they are compelled to draw their supply, and financial considerations prevent water companies from building efficient filtering beds, and delivering to the consumer water fit for dietetic purposes direct from the reservoirs. Even if the entire supply was filtered on a large scale by the water companies, the water would still be liable to take up impurity in the service pipes, which themselves are not impervious, and, surrounded as they are with soil impregnated with coal-gas and organic filth, there is danger of the water being contaminated to no small extent after it leaves the reservoirs, so that in any case domestic filtration is a safeguard no householder ought to neglect. In the cases of detached houses and villages there is more urgent need for household filtration, as there it is necessary to depend on surface wells and rain water, collected frequently in a dirty cistern.

In dealing with the impurities present in water, it will answer our purpose best if we class them under two heads:—

1. Suspended matter.
2. Dissolved impurities.

The suspended matters in water depend nearly altogether on the source of supply, or in the storage in tanks and cisterns, or substances added during distribution, either in pipes or water barrels. If the source is from the deep chalk springs we have little else than crystalline particles of carbonate of lime, or if ferruginous matters are present in the soil, this, too, finds it way readily into water. In river and lake water we meet with those numberless forms of infusorial life, and by a knowledge of the habitat of these organisms we are often enabled to tell the source from which the supply is drawn. It is a favourable sign to see the higher forms of animal and vegetable life fresh and vigorous. It is only when decomposition takes place among these, and which mostly occurs in the service pipes in large towns, that they become a source of danger. A total absence of animal life is very frequently an unfavourable sign. They are not present in very bad water, especially if there is a great excess of nitrous acid. It would seem as if these impurities were inimical to animal or vegetable existence. We gain, I think, more accurate information by carefully studying the nature of the sediment of water under the microscope, than by any single experiment short of a complete chemical analysis. Healthy and living vegetable forms, and especially the larger forms of animal life, such as the Crustaceæ, are favourable omens, whereas colourless Desmids and Diatoms and starved creatures, tell in language too plain of the unwholesomeness of the water these small creatures are forced to inhabit. There are, perhaps, no forms more significant of a suspicious water than fine oscillatorian filaments, and the passage of these into well recognised bacteria is almost insensible. Especially is this the case when the filaments are much twisted and colourless.

The *dissolved* impurities in water can only be estimated by chemical analysis, or the sense of smell or taste. If present in any large proportion they will probably favour the growth of the lower organisms. They may be of recent origin, or of more remote date, and are probably undergoing rapid change in the water. The soluble impurities of organic origin are generally estimated by the quantity of oxygen required to oxidise them, and also by the method first recommended by Messrs. Wanklyn, Chapman, and Smith. They state that nitrogenous substances existing in water yield a fixed percentage of their nitrogen in the form of ammonia, when boiled with a strong caustic solution of permanganate of potassium. The substance we have to deal with in this latter case is called albuminoid ammonia. Professor Frankland recommends estimating the organic carbon and organic nitrogen in the residue left after careful evaporation of the sample of water, and the results obtained by this method are very uniform if the experiment is carefully done. The more remote impurities may be judged by the amount of nitric and nitrous acid present, these acids being the results of oxidation, Mr. Ekin, in his manual on *Potable Water*, says: 'With regard to organic matter, a fair trial of the different processes (of chemical analyses) leads to the conclusion that all are absolutely worthless so far as distinguishing between organic matter that is dangerous and organic matter that is innoxious is concerned, but probably that all may be relied on as giving a rough approximation as to whether organic matter is present in excess or not'. If this is really a true statement of our knowledge as regards the conclusions to be drawn from a chemical analysis of drinking water it speaks much in favour of household filtration, and the necessity for no mere superficial inquiry, but for a searching examination into this important subject.

In discussing this subject it is my desire to limit it solely to the purification of water for sanitary purposes, nor is it my intention to enter on the vexed questions of the nature of the different contagia, and whether they exist in a solid, liquid, or gaseous form, but I may state that I believe that if the virus of any specific disease is present, we also nearly always have organised bodies to deal with in the same sample of water.

It would be an almost hopeless and certainly an unnecessary task to enumerate and discuss *all* the various filters. As in most other trades, there are many spurious and worthless imitations in the market.

I am informed on good authority that blocks made of porous stone, powdered glass, vegetable charcoal, coal ashes and dustings, are worked up and sold as filters. The success of any filter may be said to depend: 1st. On the quantity and quality of the water passing through. 2. On the character and suitability of the filtering medium. 3. The filter must be capable of being easily cleaned, or the filtering material readily renewed, and its legitimate work will largely depend on this latter, for be it remembered no filter is self-cleaning. The quantity and quality of the water passing through is so uncertain that little can be said under this head. The larger the quantity of water, and the greater the impurity, the oftener will the filter require renewing. The character of the filter, and the suitability of the filtering medium, is most important. It must be of a material which cannot communicate anything injurious to the water which passes through it; it must remove all the suspended matters, and render the water clear and bright; it must act on the dissolved organic matters and change their form, *i.e.*, render them innocuous. The filter must be capable of being easily cleaned, and for this purpose the simpler the construction the more effective will be the filter. All filters in which the materials are enclosed between slabs, which are cemented into the case, are to be avoided, as there is not free access to their contents; and the expense it entails to send them to the manufacturers tends to permit their use long after they have ceased to purify water, and when too often they only add to the impurities instead of diminishing them. Filtration should be downward, lateral or upward filtration is not nearly so effectual.

Filtration through Sand and Gravel.—Its action on water may be said to be two-fold; it arrests at once the larger particles on the surface, while the smaller ones, by the force of adhesion to the sand and gravel, are separated; so far, its action is mechanical. On the dissolved impurities it has little action. When first used, a certain quantity of air is present within the pores and interstices of the sand, and this has some slight effect on oxidising a small quantity of the dissolved organic matters. In a sand and gravel filter thirty-three inches in thickness, Mr. Shield gives the following numbers as the result of his experiments, viz.: The original amount of organic matter being 0.8906 grains per gallon, the amount after filtration was as follows:—after twenty-three hours' action, 1.012; after 120 hours, 0.648; after 240 hours, 0.917; after 376 hours, 0.809; on the whole, while the sand removed a small portion of the organic matter, still, with our present knowledge, we have no evidence that filtration through sand can be regarded as an efficient means of purification of polluted water. If this system is adopted by public water companies on a large scale, the water should be delivered immediately to the consumer, and not stored in reservoirs after filtration. If properly carried out, it *may* possibly lessen the liability of ill effects, but to secure this, attention must be paid to every detail; duplicate filter beds must be constructed, and if there is much suspended matter, there must also be settling basins of sufficient size. It will require constant watching, frequent cleansing, and renewal.

Filtration through Spongy Iron Filter.—Spongy iron is metallic iron which has been reduced from a hematite ore without fusion, and is consequently in a porous and finely divided condition. The weight of spongy iron is about one hundred-weight per cubic foot, and its purifying effects are largely owing to the fine state of division. It appears to be a very active agent in removing organic matter from water, and certainly reduces nitrates and nitrites, converting a part of their nitrogen into ammonia. 'There are reducing and oxidising agencies constantly at work in the spongy iron filter, and the several oxides of iron are present in their nascent state.'

The filter we experimented upon is cylindrical in shape, marked No. 6, and is thirty-four inches high, twelve inches wide at the top, and fifteen inches wide at the bottom. It has a reservoir at the bottom capable of holding two gallons. The filtering medium is spongy iron; this is placed in a perforated vessel of earthenware (like the rest of the filter) in the upper part. Although spongy iron removes impurities of an organic nature, it yields to water a certain amount of iron which has to be got rid of. This was formerly done by means of a layer of animal charcoal placed beneath the spongy iron receptacle; but since the report of the Rivers Pollution Commissioners pointed out that animal charcoal favoured the growth of low organisms, Mr. Gustav Bischof has abandoned it, and now uses what he calls 'prepared sand'. This is a mixture of very fine gravel with pyrolusite, or native black oxide of manganese. This answers the purpose of removing the excess of iron and has the further supposed advantage of being of mineral origin. The filtering, therefore, in this case, is entirely carried out through materials of inorganic origin. The water is allowed to pass into the reservoir.

Rate of delivery of water from this filter.—When the reservoir is full, water flows out at first at the rate of 25cc. in three seconds, or one gallon in nine minutes, equal to 161 gallons in twenty-four hours. As it begins to empty it slackens speed very much, until it goes down to 25cc. in eleven seconds, equal to forty-four gallons in twenty-four hours. When the reservoir was emptied and water poured in, it yielded on an average of twenty-four experiments 25cc. in 13.6 seconds, equal to thirty-six gallons in twenty-four hours. It was found, however, that the regulator tube required cleaning out, and that the spongy iron was to some extent clogged; possibly because the filter was permitted to remain without water for nearly two days. On the tube being cleared and the iron stirred up, the yield was better; thus, on the reservoir being emptied, and the water collected at the rate allowed by the regulator, the

1st quart was yielded in 7 min. 20 sec. = 49.2 gall. in 24 hours.
2nd " " 6 min. 50 sec. = 52½ " "
3rd " " 6 min. 30 sec. = 55 " "
4th " " 6 min. 50 sec. = 52½ " "
Total, 1 gallon in 27 min. 30 sec. = 52½ gallons in 24 hours.

A second experiment gave the following results:—

1st quart was yielded in 6 min. 20 sec. = 56 gall. in 24 hours.
2nd " " 5 min. 44 sec. = 62 " "
3rd " " 5 min. 32 sec. = 65 " "
4th " " 5 min. 37 sec. = 64 " "
Total, 1 gallon in 23 min. 13 sec. = 62 gallons in 24 hours.

As this size of filter is arranged to yield sixty-four gallons in twenty-four hours, it may safely be accepted that this will be fulfilled if care be taken to see that the regulator tube is clear and the spongy iron not clogged.

The arrangement of the regulator is such that the water reaches the reservoir through a small aperture, so as to keep it a considerable time in contact with the filtering medium, twenty-two minutes as an average. Of course the water could be drawn much more rapidly by taking it direct from the regulator tube, without waiting for it to pass into the reservoir.

Purifying power of the Spongy Iron Filter.—The

filter was thoroughly washed out before commencing the experiments. The solutions used were made either of pure distilled water or the tap water supplied to the laboratory. This is a surface water, containing about seven grains of total solid matter in the gallon, very little chlorine, no free ammonia and 0.1000 of a milligramme of albuminoid ammonia per *litre*.

Constituents.	Original Water.	Filtered Water.	Remarks.
First Series.			
Chlorine	1.5872	1.4880	Tap water; to which a little sewage had been added.
Total Oxygen	2.2600	0.7400	
Organic Oxygen ..	1.9400	0.6200	
Nitrous Acid	0.9200	0.3450	
Free Ammonia	1.0920	0.3472	
Albuminoid Ammonia	0.3072	0.0906	
Second Series.			
Chlorine	0.5456	0.6448	Tap water, one grain of sulphate of quinine was added to each gallon.
Total Oxygen	3.2200	0.3400	
Organic Oxygen ..	2.7000	0.1800	
Nitrous Acid	1.4950	0.4600	
Free Ammonia	0.1072	0.5952	
Albuminoid Ammonia	0.8700	0.0632	
Third Series.			
Chlorine	2.8272	1.8352	Tap water, to which was added a solution of beef made by adding water and dilute hydrochloric acid to finely cut meat.
Total Oxygen	1.8600	0.4200	
Organic Oxygen ..	1.4200	0.2600	
Nitrous Acid	1.2650	0.4600	
Free Ammonia	0.1360	0.4400	
Albuminoid Ammonia	0.8464	0.0600	
Fourth Series.			
Chlorine	1.3392	1.5872	Beef soup which was slightly sour was added to tap water; the fat was not removed from the soup.
Total Oxygen	2.4200	0.3800	
Organic Oxygen ..	1.8200	0.2600	
Nitrous Acid	1.7240	0.3450	
Free Ammonia	0.4548	0.5760	
Albuminoid Ammonia	2.5560	0.1920	
Fifth Series.			
Chlorine	1.3392	1.3392	Tap water, rotten egg, and beef infusion, which was decomposed with a little sewage. The water was rendered decidedly offensive.
Total Oxygen	5.5400	0.9800	
Organic Oxygen ..	3.3400	0.5000	
Nitrous Acid	0.3250	1.3800	
Free Ammonia	0.2096	0.6528	
Albuminoid Ammonia	3.5200	0.4756	
Sixth Series.			
Total Oxygen	0.6200	0.4200	1½ cc. of albumen from a new-laid egg were added to 9 gallons of pure distilled water, and passed through the filter.
Organic Oxygen ..	0.4200	0.3000	
Nitrous Acid	0.5750	0.3450	
Free Ammonia	0.0920	0.3584	
Albuminoid Ammonia	0.3300	0.1480	

Diminution per Cent.

First Series.	
Chlorine	− 6
Total Oxygen	− 67
Organic Oxygen	− 68
Nitrous Acid	− 63
Free Ammonia	− 68
Albuminoid Ammonia ..	− 71
Total of Organic Oxygen & Albuminoid Ammonia	−139
Mean	− 69
Second Series.	
Chlorine	+ 18
Total Oxygen	− 89
Organic Oxygen	− 93
Nitrous Acid	− 69
Free Ammonia	+455
Albuminoid Ammonia ..	− 93
Total of Organic Oxygen & Albuminoid Ammonia	−186
Mean	− 93
Third Series.	
Chlorine	− 35
Total Oxygen	− 77
Organic Oxygen	− 82
Nitrous Acid	− 64
Free Ammonia	+224
Albuminoid Ammonia ..	− 93
Total of Organic Oxygen & Albuminoid Ammonia	−175
Mean	− 87
Fourth Series.	
Chlorine	+ 19
Total Oxygen	− 84
Organic Oxygen	− 86
Nitrous Acid	− 80
Free Ammonia	+ 26
Albuminoid Ammonia ..	− 93
Total of Organic Oxygen & Albuminoid Ammonia	−179
Mean	− 89
Fifth Series.	
Chlorine	*Nil*
Total Oxygen	− 82
Organic Oxygen	− 85
Nitrous Acid	− 76
Free Ammonia	+ 31
Albuminoid Ammonia ..	− 67
Total of Organic Oxygen & Albuminoid Ammonia	−152
Mean	− 76
Sixth Series.	
Total Oxygen	− 32
Organic Oxygen	− 28
Nitrous Acid	− 41
Free Ammonia	+300
Albuminoid Ammonia ..	− 55
Total of Organic Oxygen & Albuminoid Ammonia	− 83
Mean	− 41

In carrying out these experiments, the object we had in view was to test the purifying power of spongy iron as a filtering medium.

I believe any one who will carefully consider the results obtained cannot fail to be impressed with the severe nature of the test to which this filter was subjected. It is no exaggeration of facts to say, that in no single instance would any water analyst permit a water containing so large an amount of impurity as those I experimented on to be submitted to any filtering medium with the object of rendering it fit for dietetic purposes, but would at once condemn them as unfit for use; unless, indeed, no other supply was available, as might happen with an army in the field or on the line of march. The amount of organic impurity (as gauged by the presence of albuminoid ammonia) in each series was quite sufficient to condemn each sample as unfit for drinking.

Had the exposure of the water to the action of the filtering medium been prolonged, the results would have been even more satisfactory, as I proved by actual experiment; but it was deemed desirable to permit the water to remain in contact only just so long as the regulator allowed of its doing so, *i.e.*, for a period averaging about twenty-two minutes.

The results show, I think, conclusively the power spongy iron has on organic matter, how it changes its form, and to such a one as to render it innocuous or nearly so. The organic matter in solution in water is usually composed of some combination of C, H, N, and S, any or all of these the iron attacks, or rather the oxygen which by chemical action is set free, converting them eventually into CO_2, H_2O, NHO_3, NH_3, and SO_3. The compound passes into the filtered water; it is not eliminated, but only changed in form.

Our next object was an endeavour to find out whether such results were lasting—whether we could depend on this filter to purify water for any length of time—in short, to ascertain the durability of the filtering medium.

Two courses suggested themselves to us in order to determine this point. In the first place, we passed an extremely impure sample of water through this filter. The following results were obtained by a careful analysis :—

Constituents.	Spongy Iron Filter.	Remarks.
Total Oxygen ..	0.9000	20 gallons of tap-water, into which one gallon of strong stable sewage was put, also a small cup-full of rotten egg, and a little fresh fæces. A portion was passed through the filter. Twenty gallons of tap-water were next passed through and the last gallon examined as before.
Organic ditto ..	0.7000	
Nitrous Acid ..	0.5750	
Free Ammonia ..	5.7550	
Albuminoid ditto	0.1600	

This result was so far satisfactory, as it proved that the filter still continued its purifying action.

In the second place, I took into use a No. 4 spongy iron filter in my own house. Water was first passed through this filter on the 8th October, 1878. The supply is taken from a well thirty-six feet deep, sunk in a gravel soil. I have very often made an analysis of the well water, and find that it varies very little as regards its chemical constituents. The following analysis gives a very fair example of the general character of this supply :—

Chlorine	2.7280 grains per gallon.
Total Oxygen ..	0.4600 parts per 1,000,000.
Organic Oxygen ..	0.4600 " "
Free Ammonia ..	None.
Albuminoid Ammonia ..	0.1000 " "

On the 7th of June last, when this filter had been in constant use for nearly twenty months, I made an analysis of the well water, and also of the sample drawn from the filter at the same time; the following results were obtained:—

Constituents.	Well Water.	Filtered Water.
Total Oxygen	0.1800	0.1400
Organic ditto	0.1000	0.0600
Nitrous Acid	0.2300	0.2300
Free Ammonia	None	0.0992
Albuminoid Ammonia	0.1800	None.

Diminution per cent.

Total Oxygen	— 33
Organic Oxygen	— 40
Nitrous Acid	0
Free Ammonia	+ 90
Albuminoid Ammonia ..	— 100

It must be acknowledged that for domestic filtration nothing could be more satisfactory than the action of this filter.

In the Rivers' Pollution Commissioners' Report, they state that the effect of spongy iron on the hardening constituents of water was to reduce these by about fifty per cent. This does not quite agree with the results we obtained. When the hardness was due to calcium carbonate, we found that the result of filtration was to remove nearly all of this; ferrous carbonate no doubt is formed and the calcic carbonate precipitated. On the fixed hard salts of lime and magnesia, filtration through spongy iron has no perceptible effect whatever. These results agree fairly well with those quoted in the Rivers' Pollution Commissioners' Report, as one-third of the analyses reported give the fixed hardness the same after as before filtration.

It is noteworthy the power spongy iron has on removing any traces of lead or copper which may be present in the water.

After the statement made by the Rivers' Pollution Commissioners, that certain filtering media favoured the growth of lower organisms, it appeared to us that any series of experiments which did not include a strict investigation into this matter would be incomplete; we therefore instituted a series of experiments in order to ascertain what the effect would be of storing water passing through this filter.

Samples of water were placed in glass stoppered bottles, and in bottles without stoppers. After a considerable number of weeks had elapsed, they were carefully examined under the microscope with a one-eighth and one-twelfth inch immersion lens. The original water contained very little sediment, only a little mineral grit and ferruginous matter. After passing through the filter it showed no sediment whatsoever, neither were any forms developed in it; the samples remained clear and free from sediment for months. All our experiments proved conclusively that spongy iron yielded nothing to water to favour the growth of lower organisms.

This paper would be incomplete if I omitted to mention the extremely interesting series of experiments which were made and published by Mr. Gustav Bischof in the *Proceedings* of the Royal Society for March 1878. Mr. Bischof proves the extraordinary powerful action this material has in removing the putrefactive agents in ordinary water, and demonstrates that by filtration through spongy iron putrefaction of organic matter is not only suspended for a time, but that it ceases entirely until reinstated by some putrefactive agent foreign to the water.

From time to time a very large number of samples of water, from all parts of the United Kingdom and abroad, have been received at Netley for analysis; and it is impossible to avoid noticing the fact, that there is almost a total absence of organic life in ferruginous water, and that as a rule these waters are fairly good.

The only microscopic form which appears to be constant in this class of waters is an ill-defined myceloid structure, Leptothrix Ochrœa, and in a few samples Didomohelix. I have never seen bacteria in a highly ferruginous water, and I am led to consider the presence of iron in water as an evidence to some extent of the absence of organic matter. Such, at least, is the result of our experience of these waters as a class.

One difficulty we have had to encounter several times in experimenting with this filter is, that the regulator gets stopped up, and there does not appear to be any efficient means of clearing it; the brush supplied we found useless for this purpose. Lately, however, its inventor has introduced a new regulator, which can be unscrewed, so that this difficulty is obviated. In the printed instructions which are sent with these filters, it is directed that if the water running into the cistern diminishes, 'temporarily unscrew the lower part of the tube and remove any obstruction in the small lateral opening by a fine needle, without, however, enlarging the opening'.

The metal of which the regulator is made is pure tin, and this seems to me to be too soft and liable to get bent by the least rough usage. A regulator made of silver would, I believe, meet all the requirements, and could not add much to the cost of the filter.

It is certainly an essential part of this filter that it should be kept in constant use, or at least that the spongy iron once wetted should never be permitted to dry, as under such circumstances it is very liable to cake, and the water will then find its way down the side, between the media and the earthenware, in which case there will be scarcely any exposure to the full action of the filtering medium.

One objection has been urged against these filters, and that is that they are unsuited for purifying soft waters, because these act violently on the iron and the sand does not remove it all. We have never been able to verify this statement. In several experiments the bulk of the water passed through the filter was pure distilled water, and we never found a trace of iron in the filtered water. I may add that the presence of a very small quantity of iron in water can so readily be detected by the taste, that one cannot help thinking, if this objection was the rule, we should certainly hear more about it than we do.

In concluding these notes on spongy iron filters, we may with safety state that this material is capable of exercising a powerful effect on dissolved organic matter in water; that its action is extremely uniform and satisfactory; that it is very durable, and that it is one of the best and safest filtering media in the market.

(*To be continued.*)

An epidemic of scarlatina has been prevalent at Blaydon near Newcastle-on-Tyne, following an epidemic of diarrhœa. At a recent meeting of the Local Board, the Medical Officer of Health stated that scarlet fever had proved very fatal to children, and from this cause the death-rate of the district had been swollen to 34.35 per 1000.

FILTRATION OF WATER IN THE MILITARY SERVICE.

By GUSTAV BISCHOF.

WHEN a prison, or a workhouse, or a school has to be built, one of the first considerations is the selection of a healthy locality. The purity of the air is investigated; the facility for a wholesome water-supply enquired into. The site for military stations or garrisons, on the other hand, is mostly determined by strategic or political exigencies. Thus the soldier frequently has not the advantages which are enjoyed by even a felon. It is therefore the more necessary to alleviate his lot, as far as possible, by carefully considered sanitary measures. I intend dealing for the present only with the water-supply to the military service. The importance of this subject was forcibly impressed on my mind by the following incident.

At the outbreak of the last Franco-German war, I met at a social gathering one of the Prussian Surgeons-General (General Aerzte). The causes of death in the course of a campaign were discussed, when the gentleman referred to startled us by the following remarks. 'No one,' he said, 'who has not had practical experience in field surgery, would believe the number of deaths which are directly attributable to water. After an engagement, it will unfortunately always be impossible to prevent soldiers from quenching their thirst wherever a liquid can be found, but,' he continued, 'it is sad for a surgeon to know that the water which he hands in field hospitals to feverish, sick, or wounded soldiers, will frequently be their death.' These words determined my endeavours to improve the means of purifying water. As a result, I recommended filtration through spongy (metallic) iron. After long continued trials, this method was, as well as into other countries, introduced into England and Prussia; in the former not until the now tolerably universally accepted fact had been established, that the army and navy had all along been supplied by a military man with charcoal filters, which, to say the least, were useless. We indeed read of them in the *Nineteenth Army Medical Report*, p. 170:—'When water which has been filtered through charcoal is stored for any time, it soon begins to show evidence of low forms of life, and after a time a more or less abundant sediment of organisms becomes formed; occasionally it becomes distinctly offensive.'

In Prussia, filtration through spongy iron was introduced after a severe outbreak of typhoid in 1877, in a regiment stationed in Fort Alexander at Coblentz. After a considerable interval, a report by the Royal Military Administration, dated May 11th, 1879, was communicated to me, from which the following is an extract:—'Nevertheless, I cannot but attribute the prevention, or non-recurrence of new cases of typhoid in a great measure to the improved state of the drinking-water, through use of the spongy-iron filter; the more so, as a large number of chemical analyses have proved undoubtedly, that the organic matter, nitric acid, and hardness were considerably reduced after the filtration.' Following up these investigations, the statistical sanitary report on the Prussian Army for 1874-78, published a few months ago by the medical military department of the Prussian War Office, deals first, on pp. 5 and 6, under six headings, with a large number of different filters, including charcoal filters. All of these failed to give satisfaction. We then read: '7.—More favourable was the result obtained with the spongy iron filter constructed by Prof. Bischof.' (Here follows a description of the filter, of the trials to which it was subjected, the analyses, etc.) The report continues:—'The improvement of water effected by this filter as regards the quantity and quality of various impurities occurring in water, which are important from a sanitary point of view, is unquestionably greater than that by any other known system of filtration. This has of late been further confirmed, amongst other instances, by the experience gathered in the military hospital of the garrison at Emden.'

A trial at the Army Medical School, Netley, was continued for about two years by direction of the Under-Secretary for War. The following extract is taken from the *Nineteenth Army Medical Report* for 1877, published in 1879:—'Inorganic Substances. – Of these the most important at present before the public is the spongy iron. This is a very powerful filtering substance. . . .The action of spongy iron is slow but complete; about twenty-two minutes is the time of exposure, and this is usually sufficient to purify all but very impure waters. The water filtered shows no tendency to favour the growth of low forms of life, and may be stored with impunity.' From the same number of the *Army Medical Report*, p. 143, the following is extracted:—'Fort George was the only station where zymotic diseases threatened to become epidemic, and where a positive insanitary condition has been reported, viz., the water-supply.' One of the zymotic diseases here referred to was typhoid. In the following number of the *Army Medical Report* (for 1878), p. 156, we read:—'The water at Fort George has at length been remedied by filtration through spongy iron filters. The analyses after filtration were very favourable, and *all* complaints, so loud before, have ceased.'

Notwithstanding the highly important practical experience thus obtained, the military gentleman, to whom reference has been made, finding his old filters condemned in the *Nineteenth Army Medical Report*, already referred to, had only to invent a new filtering material named carferal, to be at once reinstated as purveyor to the army and navy. Should, therefore, anywhere a similar outbreak take place to the one in Fort George, the health and lives of the British soldiers must without any necessity be experimented upon, to determine whether or not carferal will check the disease as efficiently as spongy iron.

The report on carferal will be found in the same number of the *Army Medical Report* (for 1878), which refers to the successful application of filtration through spongy iron in arresting those zymotic diseases at Fort George. Carferal, we are informed, p. 204, is composed of carbon, iron, and alumina. That carbon in all its modifications has for a short time a more or less marked chemical purifying action, is as universally admitted as the fact that the coke, which we must suppose to be present in carferal, is one of its most inert modifications. Looking at the *Army Medical Report* for 1877, and a large number of other official reports, it may perhaps also be taken for granted, that iron in the form of spongy iron is a more energetic and lasting purifying medium than in any other form. The third constituent of carferal, silicate (?) of alumina, has for a very brief time remarkable absorbing properties. I demonstrated this, some years ago, by the complete removal of strychnine, when filtering a dilute solution, even through finely granulated stoneware. But any such action ceases so rapidly as to be practically of no use whatever. Whence, then, is the supposed enormous purifying power of carferal to come from?

Such considerations ought to have led to caution,

before attaching prematurely any weight to a few laboratory experiments. However, carferal is officially recommended for use in the filters supplied to the army and navy, before, as we are informed page 204, even the exact proportions of its composition have been decided upon. Again, it is not considered necessary to state explicitly in the report that the important element 'time' had been wanting in those experiments with carferal, and that therefore the conclusions from them should be suspended. Let us refer to page 211, No. 2. Here, under the heading 'Continuity of Action', carferal is simply omitted. There is indeed in the report (page 205, Seventh Series) a single experiment intended to prove the continuity of action by the filtration of twenty (!) gallons. How many minutes can that experiment on the 'durability' have taken, considering the 'very rapid' speed at which we are told, page 211, No. 1, water can be filtered through carferal?

Nevertheless, we are assured, page 203, that the experiments were made 'with every precaution to avoid fallacy'. I reply, there could not be greater fallacy than in hurriedly experimenting on a material, whose composition was not even then definite, and which, at the present moment, may be something totally different to the one experimented upon. Is it customary to treat official enquiries of vital importance, upon which the welfare of thousands depends, in so off-hand a manner? This certainly was not done in the case of spongy iron.

I may be permitted to call attention to another unaccountable oversight. There is no attempt in the report to establish any superiority of carferal over spongy iron, excepting by the supposed greater rapidity of action of the former. This rapidity cannot possibly be unlimited, and it would therefore have been of the utmost consequence to be informed *how* rapidly water may with safety be filtered through carferal, the more so, as the previous report, referred to before, even states the minutes required for the contact between water and spongy iron. We look in vain for any such information about carferal.

Dr. De Chaumont, the author of the report on carferal, has indeed found it necessary to protest in the *Lancet* of 12th June 1880, and in other papers, against the foregoing conclusions, which were drawn from his experiments. Whether these conclusions were intended or not, they are so fully shared by the authorities that the Admiralty speak of carferal already, in a communication dated 17th May 1880, as the new material 'now in use in the Royal Navy'.

It is needless to enter into any more chemical details. Supposing even that chemistry can accurately determine the organic matter in water, the fact that it cannot distinguish between harmless and hurtful organic contamination, and that the most important and dangerous impurities in water are imponderable and of organised nature,* has led for some time, I feel almost inclined to say to a preponderating value of physiological evidence in all researches on the sanitary condition of water. In the report for 1877, on page 171, important statements are made on the physiological action of spongy iron; but about carferal, all the report for 1878 states, is the one sentence page 211, No. 3: 'Here the carferal *seems* to be equal to the spongy iron filter.' The most important evidence, however, is by actual experience, and not a single instance is on record in which results like those by filtration through spongy iron at Fort George, at Coblentz, and elsewhere, have been obtained by the use of any other filtering medium.

* From the *Journal of the Chemical Society*, July 1880, page 543 I make the following extract:—'Professor Huxley pointed out that the epidemic diseases—splenic fever, pig typhoid, and the cholera of fowls, were invariably caused by bodies of the nature of bacteria. . . He said there was every reason to believe that analogous diseases in man were caused by similar organisms.'

THE

SANITARY RECORD.

NOVEMBER 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

SOME NOTICEABLE EXHIBITS AT THE SANITARY EXHIBITION, EXETER, 1880.

We have given a detailed account of most of the exhibits at the Sanitary Exhibition at Exeter, at page 191, but take this opportunity of specially remarking on a few which struck us as being especially novel, ingenious, or useful. Of the inventions coming under these categories, we find in the class of Construction a very beautiful system of decorating wood exhibited by Mr. Webb, of Worcester, for floors, walls, etc., in which the main pattern is driven right through the substance of the wood, and a design embodying any number of colours is all produced at one operation. The dyes used contain no injurious substance and are permanent, and as the wood is laid down endwise grain it gives a better foothold and lasts longer than any other way; thus combining the beauty of a carpet with the durability of oak wood. But the most special feature of this invention is that when the colours have faded by impressed dust or clear wear, or have got uneven in surface, the tiles can be scraped level again and the colours will come out as bright as before. It has also the advantage of being waterproof, being bedded in bituminous asphalte. As a possible substitute for dusty carpets, slippery tiles, or floor-destroying oilcloth, this sanitary invention cannot fail to take its place among the most beneficial results of the year.

One of the gems of the exhibition, looked at from a sanitary point of view, and useful in domestic use, is the 'flushing rim' Lavatory basin of Messrs. Tylor of London. This thoroughly flushes the basin around. In the matter of Baths also this firm exhibited some excellent improvements. For instance, there was a bath with a quick emptying arrangement, and also an improved fullway stop valve for the hot and cold supply. This firm also exhibited a great improvement in housemaids' closets, with flushing apparatus attached. Whilst speaking of baths, notice should certainly be taken of the concrete bath of Mr. Lascelles of London, which promises to be a

marvel of cheapness when made wholesale. A gas bath of good dimensions, five feet long, which took the silver medal at Nottingham, fitted with the readiest arrangement for heating water and with a copper bottom, was shewn by Messrs. Willey, of Exeter.

Some improvements were exhibited in the matter of Ball Taps, and among these were especially noticeable one consisting of a small plug formed within a main plug, to which the lever and float are attached, and which has no leather parts or springs of any kind; invented by Mr. Joseph Willoughby of Plymouth. Mr. Meakin also exhibited his almost costless ball valve of glass, which is a perfect marvel of simplicity combined with usefulness.

Prominent in the exhibition of small appliances, but nevertheless of immense value, appeared several kinds of new valves for taps. Tylor & Son's Screw-down loose valved 'Waste Not' tap, attracted considerable attention. It is very useful at a sink, and by its means no one can waste the water from the cistern by carelessly leaving the tap running, as if so left open it will close of itself after it has run off about two to three gallons. The water waste preventing cisterns were also minutely examined, especially those of Messrs. Doulton, Cole, White and Bostel, etc.; they were for the most part constructed upon the syphon principle, so that by merely touching the chain the contents begin to discharge without having to hold the chain in the hand. A very praiseworthy exhibit in this class was the small and compact Flushing Valve and Waste Preventer of Messrs. Bean of London. It can be fitted into any kind of cistern and ensures a proper flush every time it is used. Such a contrivance is really invaluable in closets where there is no head of water to speak of and no place to put a separate water waste preventer flushing box.

Messrs. Bowes, Scott and Read, of London, made a most excellent show of Self-acting Flushing Chambers, fitted up with Field's annular syphons. For instance, there were tanks of iron holding 100 gallons for flushing house drains, and also 40-gallon tanks for utilizing clean sink slops. We noticed also the drawings of Shone's Pneumatic Sewerage System, in use at Wrexham, and also a sewer-flushing syphon arrangement, where the starting of the syphon is brought about by a peculiar delivery of some little extra water.

The sanitary ware exhibited this year was also of high value, and very prominent were the drain and sewer pipes and traps of the Branksea Poole Co., and of the Rinson Pottery, Poole. The Bourne Valley Pottery Co., of Poole, also exhibited largely, and it is evident that the West of England is not a whit behind London or Staffordshire manufacturers of this ware. The Rock Concrete Tubes of Messrs. Sharp, Jones & Co., used in main drainage works, excited considerable notice.

There was also noticeable an improved non-absorbent Pail-Van, invented by Mr. McCallum for the use of the corporation of Stafford, so arranged as to be ventilated through a deodorising substance, and thus preventing the accumulation of smells, which are present even when closed tub lids are used. This invention cannot fail to be of use in towns which are scavengered upon the dry systems.

Under the class of Heating Arrangements many excellent exhibits were made, prominent among which were the Gas Calorigens of Messrs. Farwig (George's Patent). Very considerable attention was paid to the patent Stove of Dr. Bond of Gloucester, which has the advantage of maintaining a constant current of air in the room. These stoves and others were all carefully and scientifically tested by the Judges, Messrs. Bartlett, Corfield, Eassie, and Field, and the results will be duly published. Among cooking stoves a new one, made in Exeter, called the Devonshire range, was much praised, as affording the option of a close or open range at will. The show of Gas Stoves was exceptionally fine. The Gas Company of Exeter had provided for this exhibition three silver medals, to be competed for by those who adopted gas for heating, lighting, or ventilating purposes, and hence there was a keen competition in this class.

In the matter of ventilation there was one exhibit which demanded and received especial attention. This was the patent system of Auto-pneumatic Ventilation of Mr. Hunt, and which we shall shortly explain elsewhere in our pages. The legible Spirit Thermometer of Dr. Hinckes Bird was also especially admired.

The other classes, viz.: Personal Hygiene, Foods, etc., and Miscellaneous, shewed some excellent improvements in their various articles since last year. The Dough Kneading Machine and Butter Maker of Messrs. Hancock of Dudley, attracted and deserved much attention.

THE SANITARY CONDITION OF LARGE TOWNS.

WE find that many large communities suffer from exceptional death-rates from various causes, more or less capable of being traced. One great cause is a rotten sub-soil from defective sewers, which alone is sufficient to pollute the dwellings of both rich and poor—to poison the shallow well springs, and to contaminate the air. There is no hope of a low death-rate under such circumstances.

Dr. Angus Smith truly said that some towns had closed the objectionable small middens attached to each dwelling, and in lieu of them had converted hundreds of miles of sewers into elongated cess-pools of the vilest description. Where this is the case the only safe course to adopt is not to proceed as we have been doing, but at once to commence undoing much that has been done. The inhabitants of towns living upon such foul materials as we have described can never hope to enjoy good health—the only course left for them is to

follow Dr. Angus Smith's advice and "undo as quickly and effectually as possible" the errors perpetrated by ignorant, but well-intentioned sanitarians.

Some millions of money have been worse than thrown away on what are called sanitary improvements. Local Acts of Parliament have been passed compelling the owners of cottage property, under heavy penalties, to drain each cottage into the main sewer; after a large expenditure, leading to an increased death-rate, these drains have been removed at the public expense, leaving the basements one mass of rottenness.

Some hundreds of courts in Liverpool alone are completely ruined by such sanitary blunders, the rentals received by the owners in very many cases not being sufficient to cover the interest upon money they have been compelled to expend.

The most valuable solid refuse from large towns has been reduced to little or no value by excess of water and chemical fluids, and allowed either to flow into brooks or rivers or turned upon agricultural land; in every case acting as a poison to animal and vegetable life.

The supply of water too, instead of being primarily applied for domestic purposes, is sought for for its suitability for certain manufacturing purposes. Thus, we were told, when the Thirlmere water scheme was being investigated, that Manchester required a different kind of water to Liverpool; from the presumption, we suppose, that bleaching in the one and sugar boiling in the other are of more importance than human life. All these blunders make it indeed appear probable that if a premium was offered for the most objectionable and in-sanitary method of applying sanitary science, the Health Committees of some of our large towns would secure the prize.

NOTES OF THE MONTH.

'COMBE' LECTURES ON HEALTH.

It is announced that the trustees of the late George Combe have made arrangements to utilise a portion of the funds at their disposal in accordance with the disposition of Mr. Combe, for the diffusion of a knowledge of physiology and the laws of health in large provincial towns and manufacturing centres, during the ensuing winter and spring. The trustees have appointed Dr. Andrew Wilson, F.R.S.E., as the 'Combe Lecturer', and that gentleman has been engaged in arranging for courses of lectures to be delivered in Kirkcaldy, Dunfermline, Stirling, and Dundee. The lectures will number from eight to ten in each town, and will be delivered once a week, in the evening. We have made arrangements to lay an authentic *resumé* of these lectures before our readers.

BAD DRAINAGE TO HOUSES.

At a recent meeting of the Health Committee of Nottingham, Dr. Seaton, the Medical Officer of Health and the Chief Inspector, gave some evidence corroborative of much that we have written about improper drain-laying, and jointing of drains and an evil communication with the street sewer. At the risk of 'iteration most distressful', we quote a passage. In the house in question he states that 'the waste water pipe of the bath, that of the lavatory, and also that of the sinkstone in the butler's pantry, ran direct into the soft water cistern. The overflow pipe of the soft water cistern went direct into the outlet drain communicating with the main sewer. At the time of inspection it was stopped up near the point of junction with the sewer, and the greater part of the house drainage, including that of two water-closets, backed up into the soft water cistern. At other times, when clear, the gas from the sewer would get into the cistern by means of the overflow pipe.' This house was in a bad way, and stood about A 1 in unhealthiness, but what else could result from taking the overflow of the rain-water tank under the basement floor into the drain at all, instead of delivering it into the open air. It is more than probable that the butler's sink was taken into the tank by some apprentice who fancied it was the cesspool. We have ourselves seen an urinal deliver into the rain-water tank, which supplied the laundry. It is certain, however, that nothing can be done in the way of cure until the builders are made amenable to law.

MICROGERMS AND THE MORTALITY FROM ZYMOTIC DISEASES.

In a very interesting article recently published in the *Journal d'Hygiène* by Dr. Marié Davy, entitled 'Epuration des eaux d'égouts par la sol de Gennevilliers', some important results of experiments made by M. P. Miquel are given at some length. In the first part, the manner in which the experiments were conducted are described, and show that due care was used in determining the results. Dr. Marié Davy points out the paucity of microgerms and the small amount of ammonia in the water of the main drain of Asnières, as compared with the large number of the former in excess of the latter found in the water of the Seine, which he attributes to the purifying power of the soil of Gennevilliers. As the results of the experiments, he says that the spores of cryptogams, and the microgerms of bacteria, obey different laws as regards their diffusion in air; that whilst both have a tendency to increase during warm weather, the former are more rapidly developed when the air is moist, whilst the latter (microgerms) increase chiefly when the air is dry, and decrease when it becomes moist. Also, that whilst an exceedingly small minority only of microgerms can be suspected of being injurious, the greatest proportion are certainly innocuous to man. In this opinion, at any rate so far as microgerms contained in water are concerned, he is in accord with the opinions expressed by Dr. Saunderson in his work on the *Origin and Distribution of Microgerms in Water*. A table is given in the paper, showing the relations between the amount of rainfall, the number of microgerms in the air, and the mortality from zymotic diseases, especially of typhoid fever, from October 1879 to June 1880, inclusive. The table shows that in the winter months, *i.e.*, from December to March, inclusive, the number of microgerms are comparatively small, whether or not there was much rainfall; but in October and November 1879, and in May and June 1880, the number of microgerms found was, with one or two exceptions, in proportion to the amount of rainfall, being greater when the amount was large, and smaller when it was below the weekly average. The mortality from zymotic diseases as a whole, and the number of microgerms in the air, did not bear a close

relation to each other, except as regards typhoid fever, which caused a mortality in inverse proportion to the number of germs. In some weeks the germs and the mortality were both much below the average. M. Marié Davy thinks that during the winter months comparatively innocent bacteria are chiefly found in the air; but that in February 'new kinds of bacteria enter on the scene'. The results arrived at are—1st. That the odours which accompany certain emanations are no characteristic sign of their hurtfulness; for instance, sulphuretted hydrogen in small quantities, and the empyreumatic vapours given off by burning animal matters are not 'miasmatic'. 2nd. That humidity of soil is an efficacious obstacle to the diffusion of hurtful germs, whilst dryness favours their growth. 3rd. That dry rubbing, sweeping, and dusting apartments or public places, aid in the diffusion of germs that may have been deposited there. He therefore recommends limewhiting of walls, and washing all other substances where water can be used without injury to the article to which it is applied.

In a later number (207) of the *Journal d'Hygiène* there is a short notice of the last researches of Professor T. Cordeli, of Rome, on the *Bacillus Malariæ*, from which it appears that he has been successful in discovering, after long search, bacilli containing spores, which he considers settles the point as to the propagation of these microscopic bodies in the earth. Also, that this discovery accounts for the occurrence of marsh malaria, and consequent fever in those exposed to infection, in places not inhabited either by man or any other animal capable of contracting malarial diseases. He believes, in common with Professors Klebs and Marchiafava (who has found the *bacillus malariæ* in the blood of three patients during the cold stage of malarial fever), that these bacilli are the specific agents of malarial disease. We may also mention the presence of the *bacillus anthracis* in the blood of persons who have died from Woolsorter's Disease, which shows that this disease is either caused by or gives origin to this microgerm. The presence of living bacteria in the fresh discharges of cholera patients, discovered by Dr. Hassall many years since, and also in cases of summer diarrhœa, which have been noticed by several observers, as well as in numerous cases of poisoning by dripping reported by Dr. Tripe, show that there is a large field of observation open to those who feel inclined to make additional investigations in this branch of medical science.

SEWER VENTILATION.

Another batch of more or less worthy correspondence, has found its way into the columns of a contemporary, having for its subject the vexed one of Sewer Ventilation. One correspondent recommended the ventilation of the sewers up the gas lamps, forgetful what would happen when, perchance, a runaway vehicle caused the ventilating post to resemble the leaning tower of Pisa, or broke it off short altogether, and unmindful of the explosive nature of the sewer gas when long pent up, and of the danger of ventilating the sewer at so low a level. Another would have the ends of the soil pipes, and drain and sewer ventilating pipes, fitted up with boxes containing charcoal, after the recipe of Dr. Stenhouse in 1854; but, if the aspects of our roof-tops are rendered hideous now by our chimney cowls and tallboys, what would architecture say to boxes without number peeping up here and there on every house, and who could undertake to renew the material when its powers of slow combustion had vanished? There have also been outcries against the ventilation of the sewer up the crown of the arch or by open gullies, and proposals to return to Mr. Spence's idea of tall chimneys and foul air-consuming furnaces. No one denies that sewer gas is a dangerous thing and a tangible evil, but more foolish things have been said concerning it than of perhaps anything else. The wonder is, why we are still allowed to engender it. There ought to be no sewer gas, and the sewer air should be no more hurtful than the air of an old-fashioned place of retreat in the garden. But we are still allowed to box up the air of our sewers, thus preventing proper ventilating currents, whilst as for the air of our house drains which are mostly trapped off from the sewer, they are simply horrible and death-dealing. We should cease to talk about sewer gas, and call it by its right name, viz., drain gas. Were the sewers of a town laid down on a thoroughly self-cleansing system, with added occasional flushing, and were they more frequently ventilated along their line of march, there would be no sewer gas. And were the drains trapped off from the sewer and fresh air taken in at this point, and made to course continuously along the house-drain, with ventilating pipes at each extremity of ramification, and all hydraulically sealed traps also ventilated through the wall, there would be no drain gas. Until this has been done it is foolish to revert to older schemes, to which no engineer would trust, and which have been proved over and over again to be the most complete nonsense.

A SANITARY IMPROVEMENT.

Mr. Spencer Rolfe, C.E., of Westminster Chambers, claims to have invented a simple and satisfactory plan for the ventilation of sewers. In the majority of towns which discharge their sewage into a river or the sea, when the sewers are discharging at the flood opening, great inconvenience is experienced by the wind blowing in, and in many cases forcing the traps of the houses. Mr. Rolfe explains this difficulty by asserting that both the large and small valves, as at present constructed, are not only almost universally useless for the purpose for which they were intended, but in many cases are positively injurious. In the existing valves but a small quantity of sewage flowing through will open them sufficiently for there to be a free passage for air, equal, or nearly equal, in area to the unoccupied portion of the sewer or drain. Moreover, the sewage shooting out round the sides of the valves not only greatly interrupts the flow, and renders the carefully formed channels at manholes and elsewhere useless, but the churning action imprisons a quantity of air, which is given off in the smooth run of sewer, possibly to form a nuisance by rising at the ventilators charged with foul gases. All these difficulties Mr. Rolfe claims to overcome simply by making the top of the flap square and the sides parallel, and fixing flat wings, which extend down each side, and terminate in a carefully formed lip at the bottom. Thus the sides of the valve, in opening, are protected by the wings, and no air or gas can pass in, whilst the sewage flows through in a solid stream, and without loss of velocity. Mr. Rolfe has also made his system, without difficulty, applicable to valves already fixed, thus obviating the necessity of removing and replacing them by others. Messrs. Emmerson, Mur-

gatroyd and Co., of Stockport, have been deputed to undertake the practical working of this important sanitary improvement.

THE HEALTH OF PARIS.

A subject of the highest importance to the health of Paris has been brought under notice by Dr. Lutaud and M. Boutmy, at the Académie des Sciences. The Paris drinking-water is well known to be unsafe, and frequently to contain an excess of albuminoid organic matter, derived from sewage which flows into it, and likely to contain the germs of typhoid fever, diarrhœa, and dysenteric affections. It appears now, from the analyses of M. Boutmy, that not only is the *eau de seltz* in Paris syphons often two or three times as impure as ordinary river water, but that it frequently contains doses of lead, copper, and tin, in very appreciable and noxious quantities. The amount of lead contained in some samples examined was more than that contained in a water which poisoned the Orleans family at Claremont. It is not necessary to go much further to seek the cause of the ever present scourge of Paris—typhoid fever, to which so many of the adult population fall victims. A severe and rigid supervision will ultimately become necessary, and meantime the *mot d'ordre* must be caution to water-drinkers. The syndicate of mineral water manufacturers has protested promptly; but against the figures of M. Boutmy a protest is not very effective: the victims of such waters and their relatives have a better right to protest. There is a vain idea that the noxious qualities of water containing organic matter may be overcome by adding claret to it and drinking what is known as *eau rougie*. This is, of course, an utter fallacy; nothing will overcome the danger of such water but boiling and filtering it, and the mere addition of a little claret hides the nauseous flavour of the water, and covers up the signs of danger, without in any way removing the actual peril which lurks beneath.

THE SEWERAGE OF THE LOWER THAMES VALLEY.

We hear on good authority that the decision of the Local Government Board has been given on the now long-outstanding question of the drainage of the Lower Thames Valley, though we believe the official communication to the Sewerage Board has not yet been made public. It is understood, however, that Mr. Thornhill Harrison, who so ably and patiently conducted the investigation, recommends that, of the three plans suggested—irrigation, chemical treatment, and total diversion—the latter is the one that is open to the least objection and opposition. The Local Government Board have sustained this conclusion of Mr. Harrison, and there seems, therefore, to the Sewerage Board no choice but to accept it. This scheme of total diversion was, it may be remembered, proposed by Sir Joseph Bazalgette, and it has received much prominence during the various enquiries and select committees on the subject. Sir Joseph, in his evidence before Mr. Harrison, said that when the West Kent Main Sewage Works were projected, the authorities, finding that to make their main sewer somewhat larger would not add much to the cost, determined, in view of the advantages that would accrue from the enlargement, and the difficulties of the Thames Valley Board, to construct their sewers of sufficent size to take in the sewage of the Thames Valley. Mr. Harrison's recommendation would appear to be, therefore, that the Thames Valley Board should make arrangements for the entry of their sewage into the West Kent sewers, arrangements that will doubtless demand much and careful negotiation. We defer any remarks for the present on the merits of the proposal.

BUXTON.

A correspondent writes, with reference to the report of Dr. Robertson, as to the 'Devonshire Hospital and Buxton Charity'. 'I see in his report Dr. Robertson says that a grant has been made by the Governors of the Cotton District Convalescent Fund of £24,000 for the extension and improvement of this hospital. He also adds that the 'dome has been simply necessary to obtain the space needful for the reception of the patients conditioned for by the Governors'. It is not easy to understand how patients are to find space in the dome; but it might be satisfactory to know what fund is this 'Cotton District Convalescent Fund'? How is it that such an enormous balance in hand is left as £24,000? who contributed to it? and by what power is this money spent in enlarging and improving a local charity in Derbyshire? What was the nature of the contract? and, finally, if the Governors have sufficient authority so to use this money, how are the inevitable repairs on such an enormous structure to be provided for? If this is public money, and if it was subscribed by the public for a definite object, the public should surely have some voice in the matter before such an enormous sum is given away on any local charity, however good it may be.'

LONGEVITY IN YORKSHIRE.

Yorkshire is proverbial for its long livers, and by way of testing this practically a correspondent took down the ages which were engraved upon the tombs in the small village of Bransdale, the hunting lodge of the Earl of Feversham, and found that out of fifty-one recorded deaths, thirty-seven were over the allotted three score and ten. Twenty were between 70 and 80 years, eleven between 80 and 90, and five between 90 and 94. The rest gave numbers such as 64, 65, 68, and so on up to 70, and but three were under 50 years. This speaks well for plain living and constant exercise. The oldest record was of a parishioner who died in 1773 at the age of 91.

THE PUBLIC HEALTH DURING OCTOBER 1880.

THE mean temperature during October at the Royal Observatory, Greenwich, was 46°.2, which was 3°.7 below the average October temperature in 100 years. Last month was the coldest October during the past thirty years; the nearest approach to so low a mean temperature in October as that recorded last month, was 47°.8 in 1872 and 1873. A slight excess of temperature prevailed on five days of the month, whereas on each of the other 26 days the mean was considerably below the average. The 20th was the coldest day in the month, when the mean temperature was only 34°.4, and showed a deficiency of 16°.2. Rain was measured at Greenwich on 18 of the 31 days of the month, to the aggregate amount of 7.7 inches; the average October rainfall recorded at Greenwich during 61 years was 2.8 inches, or 4.9 inches below the amount actually

recorded last month. The heaviest October rainfall since 1860 until this year was 5.9 inches in 1865, which was measured on 19 days. The sun was above the horizon during 328.7 hours during October, but only 52.3 hours of bright sunshine were recorded; the average amount of bright sunshine in October during the three years 1877-8-9 was 89.5 hours, and more than 37 hours in excess of the amount measured last month. The direction of the wind was unusually variable during the month.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing an estimated population of about seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 19,687 births and 12,681 deaths were registered during the four weeks ending 30th October. The births were equal to an annual rate of 34.2 per 1000 of the estimated population in the twenty towns; it was 34.6 in London, and 33.9 in the nineteen provincial towns, and ranged from 24.7 and 29.6 in Brighton and Portsmouth, to 37.4 both in Liverpool and Wolverhampton. The annual death-rate during the four weeks of October was equal to 22.1 per 1000, against 24.5 and 24.1 in the two preceding months. The average October death-rates in the three years 1877-8-9 were respectively 22.6, 24.9, and 23.7. The English urban death-rate during October was therefore below the average, notwithstanding the unseasonably low temperature, and heavy rain-fall recorded.

The lowest annual rate of mortality in the twenty towns during October was 19.1 in Birmingham. The rates in the other towns, ranged in order from the lowest, were as follow:—Sheffield, 19.3; Bristol, 19.7; Portsmouth, 20.6; Leeds, 20.7; London, 20.8; Plymouth, 21.2; Brighton, 21.5; Wolverhampton, 21.5; Newcastle-upon-Tyne, 22.1; Oldham, 22.3; Manchester, 23.1; Nottingham, 23.2; Bradford, 23.3; Norwich, 23.4; Sunderland, 26.2; Liverpool, 28.1; Hull, 28.3; Salford, 28.4; and the highest rate during the month was 30.0 in Leicester. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during October averaged 23.3 per 1000, whereas in London it did not exceed 20.8. A considerable excess of zymotic fatality occurred last month in Sunderland, Liverpool, Hull, Salford, and Leicester.

The 12,681 deaths from all causes in the twenty towns last month included 2,125, which were referred to the seven principal zymotic diseases; of these 787 resulted from diarrhœa, 596 from scarlet fever, 252 from fever (principally enteric), 218 from whooping-cough, 174 from measles, 78 from diphtheria, and 20 from small-pox. These 2,125 deaths were equal to an annual rate of 3.7 per 1,000 in the twenty towns during the four weeks under notice, against 7.8 and 6.9 in the two preceding months. The zymotic death-rate did not exceed 2.9 per 1,000 in London, but averaged 4.4 in the nineteen provincial towns. The lowest annual death-rates from these seven diseases during October were 2.4 in Newcastle-upon-Tyne, and 2.8 in Sheffield, Portsmouth, and Plymouth; while the rate ranged upwards in the other towns to 6.8 in Leicester, 7.3 in Salford, and 8.6 in Sunderland. Scarlet fever was the main cause of zymotic fatality in Sunderland, while the death-rate from these diseases was more generally excessive in Leicester and Salford. The annual death-rate from diarrhœa, which had been equal to 5.8 and 5.0 per 1,000 in August and September, declined to 1.4 in October; it was only 0.8 in London, but averaged 1.9 in the nineteen provincial towns. The largest proportional fatality of diarrhœa in the twenty towns last month occurred in Sunderland and Salford. The 596 deaths from scarlet fever showed a further increase upon recent monthly numbers, the greatest fatality occurring in Sunderland, Oldham, and Liverpool. The fatal cases both of measles and whooping-cough were somewhat below the average monthly numbers; measles was most fatal in Leicester, and whooping-cough in Hull and Liverpool. The 252 deaths referred to fever (including typhus, enteric, and simple) showed a slight proportional increase upon the number in the previous month; they included only 97 in London, whereas 155 were returned in the nineteen provincial towns. The highest death-rates from fever in the twenty towns last month occurred in Salford and Leicester. Small-pox caused 20 more deaths in London, whereas no death from this disease was recorded in any of the nineteen other large towns. The fatality of small-pox in London during October showed a further increase upon that recorded in the two preceding months. The number of small-pox patients in the metropolitan asylum hospitals, which had been 216, 178, 128, and 95 at the end of the four preceding months, rose again to 105 at the end of October. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 23 in August and 15 in September, rose again to 20 during the four weeks of October. The increase both of patients under treatment, and of new cases admitted during October, afforded conclusive evidence of greater small-pox prevalence in London; this increase has since been maintained.

The fatality of diseases of the respiratory organs, influenced by the low temperature, showed a marked increase during October. The average weekly number of deaths referred to these diseases in London, which had been 155 and 160 in August and September, rose to 299 in October, and exceeded the corrected weekly average for the corresponding month in the ten preceding years by 30. The annual death-rate from these diseases last month was equal to 4.3 per 1,000 in London. The death-rate from lung diseases last month in those of the nineteen provincial towns for which the information is available ranged from 3.0 and 3.3 in Plymouth and Newcastle-upon-Tyne to 5.0 and 5.8 in Sheffield and Salford.

In the outer ring of suburban districts around London, having a population of little less than a million persons, the annual death-rate from all causes during October did not exceed 15.5 per 1,000, against 18.7 and 17.9 in the two preceding months; and the zymotic death-rate, which had been equal to 4.5 and 5.7 in August and September, declined to 2.1 per 1,000. The rates from all causes, and from the seven principal zymotic diseases in inner or registration London, were, as before stated, 20.8 and 2.9 per 1,000 respectively.

The accompanying table contains uniform October mortality statistics for 214 urban districts, for which we are indebted to the local medical officers of health. During the fifteen preceding months the number of contributing sanitary districts had steadily increased from 36 to 198. The promises which we have received of further contributions to this table enables us to anticipate a continuance of the steady increase which has hitherto marked the growth of our monthly table of mortality statistics. On the 30th of October, 243 post cards were sent out to the medical officers of health of as many urban sanitary districts, including 24 first invitations to contribute.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,664,149	9719	5842	1522	1012	*	*	*	1177	823	20	95	279	44	71	97	217	1195	628	201	1086	34.6	20.8	2.9	4.3	
ABERSYCHAN	14,000	25	22	6	4	..	1	4	7	..	..	..	..	..	..	..	..	5	1	1	..	21.0	18.5	0.0	4.2	J. W. Mulligan, M.D.
ABINGDON	6,033	23	11	3	1	..	..	4	3	2	..	..	..	..	..	..	..	2	1	..	..	44.9	21.5	3.9	2.0	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	83	41	5	15	2	2	7	10	6	..	2	..	..	..	..	..	4	12	3	..	32.6	16.1	2.4	4.7	T. Milne, M.A., M.D.
ACTON†	16,000	43	12	4	1	1	1	3	2	..	..	..	..	..	..	..	..	..	1	1	1	35.0	9.8	0.0	0.8	T. Francis.
ALTRINCHAM	12,000	25	13	4	2	1	1	3	2	3	..	..	2	..	..	..	..	1	1	..	..	24.5	12.8	2.9	1.0	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	93	71	21	13	2	2	16	17	21	..	1	3	1	2	1	13	9	10	..	3	32.8	25.0	7.4	3.2	W. H. Hughes.
ASPULL	8,000	22	12	5	3	..	..	3	1	2	..	..	1	..	..	..	1	4	..	..	..	32.4	17.7	2.9	5.9	H. Smith.
ASTLEY BRIDGE	5,750	11	7	1	3	..	..	1	2	3	..	3	..	..	..	..	..	..	1	..	..	22.5	14.3	6.1	0.0	R. Settle, M.D.
ASTON MANOR	52,821	157	73	28	10	3	3	21	8	9	..	..	..	..	..	1	8	17	6	1	..	35.0	16.3	2.0	3.8	H. May.
AUDENSHAW	6,000	11	21	5	6	1	3	2	4	5	..	..	..	..	1	2	2	..	..	..	..	21.6	41.2	9.8	0.0	R. Slater.
BAILDON	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. Walker.
BANBURY†	13,500	*	18	3	1	..	2	4	8	3	..	..	..	..	..	..	3	2	2	1	..	*	17.4	2.9	1.9	R. Grimbly.
BANGOR	7,835	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. Rees.
BARNSLEY	30,000	81	63	19	12	*	*	*	10	16	..	..	1	1	2	3	9	5	11	1	2	31.8	24.7	6.3	2.0	M. T. Sadler, B.A., M.D.
BARROW-IN-FURNESS	40,000	143	65	23	16	4	9	10	3	9	..	..	1	..	2	1	5	14	3	5	4	42.1	19.1	2.6	4.1	J. Settle.
BATH†	53,649	81	71	17	6	1	1	22	24	10	..	..	..	..	2	2	6	11	9	1	8	19.7	17.2	2.4	2.7	A. B. Brabazon, M.D.
BATLEY	29,851	80	49	18	12	1	1	9	8	9	1	..	..	..	2	..	6	10	1	..	1	31.6	19.3	3.6	3.9	W. Bayldon.
BECCLES	5,000	10	9	2	2	..	1	1	3	1	..	..	..	..	..	..	1	..	3	1	..	23.5	21.2	2.4	0.0	E. B. Crowfoot, M.B.
BECKENHAM‡	12,200	*	12	3	2	2	..	1	4	2	..	2	..	..	..	..	..	2	1	..	..	*	10.4	1.7	1.7	C. O. Baylis, M.D.
BELGRAVE	8,000	29	16	8	5	..	..	1	2	3	..	..	..	..	..	..	3	6	..	1	..	42.7	23.6	4.4	8.8	A. W. Emms.
BETHESDA	6,610	20	15	3	1	1*	2	7	1	4	..	..	1	..	..	1	2	3	2	..	..	35.7	26.7	7.1	5.3	H. Rees.
BILSTON	25,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	S. G. Gilbert.
BINGLEY	9,000	22	16	7	1	..	..	3	5	2	..	..	1	..	..	..	1	2	2	..	..	28.8	20.9	2.6	2.6	J. W. Craig, M.D.
BIRMINGHAM†	394,738	1055	568	176	109	23	23	139	98	91	..	1	10	4	12	7	57	107	53	19	68	34.8	18.8	3.0	3.5	A. Hill, M.D.
BISLEY	5,264	11	8	5	..	..	1	..	2	..	..	..	..	..	..	..	..	..	1	..	..	24.6	17.9	0.0	0.0	T. Partridge.
BLACKROD	4,000	9	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	26.5	2.9	0.0	2.9	H. Smith.
BLYTH	2,000	6	2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35.3	11.8	0.0	0.0	H. D. Ward, M.D.
BOLTON†	106,500	258	159	42	39	7	8	36	27	32	..	..	11	..	3	3	15	27	13	5	..	31.6	19.5	3.9	3.3	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	46	16	10	2	..	14	4	12	..	..	2	..	1	3	6	7	..	4	1	*	21.9	5.7	3.3	R. J. Sprakeling.
BOSTON†	15,000	29	22	3	..	..	1	6	12	..	..	..	..	..	..	..	..	2	2	..	5	25.2	19.1	0.0	1.7	W. Clegg.
BRADFORD (LANC.)†	15,000	47	33	12	13	3	1	2	2	5	..	..	..	..	..	..	5	7	1	1	..	40.8	28.7	4.3	6.1	J. Hudson.
BRADFORD (YORKS.)†	197,196	520	351	92	74	23	28	80	54	69	..	1	16	1	9	12	30	68	27	5	26	34.4	23.8	4.5	4.5	H. Butterfield.
BRAINTREE	5,000	*	3	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	*	7.1	0.0	0.0	J. Harrison.
BRENTFORD	11,557	31	15	2	1	1	2	5	4	1	..	..	1	..	..	..	..	2	1	1	..	31.6	15.3	1.0	2.0	J. Williams, S.Sc.C.Camb.
BRIDGNORTH	6,000	6	11	2	..	..	..	2	7	2	..	..	..	..	..	..	2	..	1	..	..	11.8	21.6	3.9	0.0	A. Mathias.
BRIDGWATER	13,000	42	26	5	5	4	2	7	3	7	..	1	4	..	..	2	..	..	1	1	1	38.0	23.6	6.3	0.0	F. J. C. Parsons.
BRIDPORT	8,145	17	7	2	1	..	..	2	2	..	..	..	..	..	..	..	..	1	1	..	1	24.6	10.1	0.0	1.4	G. M. Evans.
BRIGHTON†	107,321	203	177	38	*	*	*	*	43	28	..	4	11	..	1	5	7	*	*	4	23	24.7	21.5	3.4	*	
BRISTOL†	213,536	571	323	92	*	*	*	*	60	57	..	3	22	2	2	1	27	*	*	14	47	34.9	19.7	3.5	*	
BROMLEY (KENT)‡	14,293	*	15	7	2	..	..	4	2	5	..	..	..	..	..	..	5	2	..	1	..	*	10.9	3.6	1.5	C. O. Baylis, M.D.
BROMSGROVE	6,967	13	8	1	1	..	..	6	..	2	..	..	..	..	..	..	..	..	2	..	1	22.0	13.5	3.4	0.0	C. Carey.
BROWNHILLS	11,000	20	7	2	3	1	..	1	..	3	..	..	2	..	..	..	1	1	..	..	..	21.4	7.5	3.2	1.1	D. E. Flinn.
BURNLEY†	56,000	*	88	31	10	2	5	14	20	26	..	..	..	..	..	1	25	11	11	2	..	*	20.5	6.1	2.6	T. Dean, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Burslem	29,159	81	53	14	24	..	1	9	5	18	..	5	..	..	2	1	10	8	2	..	..	32.7	21.4	7.3	3.2	J. M. Taylor.
Burton-upon-Trent	33,000	120	73	23	8	2	*	21	15	11	1	2	1	..	..	1	6	8	12	2	7	42.8	26.0	3.9	2.9	C. Perks.
Bury‡	50,000	168	113	39	23	*	*	*	20	20	1	..	7	..	1	1	10	17	13	3	4	35.0	23.6	4.2	3.5	H. Ashworth.
Bury St. Edmunds	15,600	34	31	9	3	3	1	7	8	2	..	..	1	..	..	1	..	3	2	..	2	25.7	23.4	1.5	2.3	F. W. Clarke.
Camborne	15,000	*	17	7	1	..	2	3	4	3	..	..	..	1	..	1	1	3	2	..	..	*	13.3	2.4	2.4	E. S. Angove.
Cambridge	34,500	65	44	14	4	3	..	10	10	2	..	..	..	..	..	1	1	4	4	..	5	22.2	15.0	0.7	1.4	B. Anningson, M.D.
Canterbury	20,962	41	29	10	3	..	..	3	13	6	..	..	..	..	..	..	6	1	..	..	2	25.5	18.0	3.7	0.6	F. Wacher.
Cardiff	82,364	227	115	31	25	10	5	30	14	18	..	..	4	3	2	2	7	14	15	8	12	32.5	16.4	2.6	2.0	H. J. Paine, M.D.
Carlisle‡	35,000	112	86	20	13	2	4	27	20	10	..	1	1	..	2	2	4	11	8	..	9	33.4	25.6	3.0	3.3	R. Elliot, M.D.
Carnarvon	10,407	21	12	3	3	1	..	2	3	..	..	..	..	..	..	..	..	2	2	..	..	23.8	13.6	0.0	2.3	H. Rees.
Chatteris	4,769	9	8	..	3	..	..	5	..	1	..	..	..	..	1	..	..	2	1	1	..	22.2	19.8	2.5	4.9	M. O'Conner.
Chelmsford	9,700	24	16	6	1	1	1	4	3	3	..	..	..	2	..	..	1	1	1	1	2	29.1	19.4	3.6	1.2	E. H. Carter.
Heltenham†	45,000	74	67	18	7	1	3	12	26	7	..	..	2	..	..	..	5	11	3	..	5	21.4	19.4	2.0	3.2	T. Wright, M.D.
Chiswick†	12,000	45	8	3	..	1	..	1	3	..	..	..	..	..	..	..	..	..	..	..	..	48.9	8.7	0.0	0.0	F. C. Dodsworth.
Cirencester	7,000	*	23	6	4	2	1	5	5	7	..	..	..	..	1	..	6	1	2	..	3	*	38.7	11.8	1.7	F. T. Bond, M.D.
Cleckheaton	9,250	28	10	3	4	..	..	2	1	..	..	..	..	..	..	..	..	3	..	..	..	35.6	12.7	0.0	3.8	H. O. Steele.
Cockermouth†	5,550	*	9	..	3	..	3	2	1	2	..	..	2	..	..	..	..	..	1	1	2	*	21.1	4.7	0.0	J. Ward, M.D.
Colchester	28,924	71	43	3	7	9	4	8	12	7	..	..	6	..	..	1	..	6	4	2	8	28.9	17.5	2.8	2.4	E. Waylen.
Congleton‡	12,000	32	29	9	1	1	1	9	8	3	..	..	..	..	..	1	2	4	3	..	..	27.8	25.2	2.6	3.5	P. M. Davidson.
Consett	7,868	26	6	1	2	..	..	3	..	..	..	..	..	..	..	..	..	2	2	1	..	38.9	9.0	0.0	3.0	W. M. Renton, M.D.
Coseley†	23,000	76	45	18	7	3	2	6	9	3	..	..	..	..	2	..	1	9	1	4	..	43.1	25.5	1.7	5.1	J. Eagleton.
Coventry†	41,000	110	64	14	12	4	9	12	13	13	..	2	9	..	1	..	1	8	5	4	7	35.0	20.3	4.1	2.5	M. A. Fenton, M.D.
Cowpen	5,000	11	13	5	2	..	..	6	..	2	..	..	..	..	..	1	1	3	..	..	..	25.9	28.6	4.7	7.1	H. D. Ward, M.D.
Crewe	26,737	53	37	13	12	..	2	7	3	9	..	..	1	..	1	3	4	7	3	..	..	23.3	16.3	4.0	3.1	T. C. Bailey.
Crompton†	10,000	20	16	5	3	..	..	7	1	1	..	..	..	..	..	1	1	5	3	1	..	23.6	18.8	1.2	5.9	W. Brooke, M.D.
Croydon	71,000	182	94	23	16	9	7	24	15	18	..	..	8	5	..	2	3	10	17	3	10	30.2	15.6	3.0	1.7	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	*	9	1	5	..	1	1	1	6	..	6	..	..	..	..	..	1	1	..	..	*	27.6	18.4	3.1	L. Armstrong.
Derby†	80,385	209	131	40	35	4	8	26	18	17	..	9	1	..	1	4	2	19	9	2	9	33.9	21.2	2.8	3.1	W. Iliffe.
Derreham, East	5,791	15	15	2	1	1	2	1	8	3	..	2	..	..	..	..	1	..	1	..	..	30.5	30.5	6.1	0.0	H. B. Vincent.
Devonport†	50,000	126	66	18	10	5	1	15	17	8	..	..	3	2	1	..	2	10	2	3	4	32.8	17.2	2.1	2.6	J. May, jun.
Dorchester	7,500	13	12	5	..	..	..	5	2	1	..	..	..	..	..	..	1	3	1	..	..	20.4	18.8	1.6	4.7	E. J. Day.
Dover	33,636	80	31	8	3	5	..	8	7	4	..	..	..	..	1	..	3	5	5	1	1	28.0	10.9	1.4	1.8	M. K. Robinson, M.D.
Droitwich	3,600	9	4	..	..	1	..	2	1	..	..	..	..	..	..	..	..	..	1	..	..	29.4	13.1	0.0	0.0	H. Swete, M.D., S.Sc.C. Camb.
Droylsden	8,000	21	14	3	8	..	..	1	2	7	..	..	1	..	4	..	2	..	..	..	..	30.9	20.6	10.3	0.0	R. Slater.
Eastbourne	18,000	*	32	8	5	..	1	12	6	2	..	..	..	..	1	1	..	4	2	..	5	*	20.9	1.3	2.6	E. F. Fussell, M.B.
East Ham†	9,937	21	11	4	5	1	..	1	..	4	..	..	2	..	..	..	2	1	1	..	1	27.6	14.4	5.2	1.3	H. H. Mason, S.Sc.C.Camb.
Ebbw Vale‡	17,000	*	14	6	4	..	..	2	2	3	..	..	..	..	..	2	1	5	..	..	..	*	8.6	1.8	3.1	J. W. Davies, M.D.
Epsom	7,550	*	10	2	..	..	1	2	5	3	..	..	..	..	..	2	1	1	1	1	..	*	25.6	4.7	1.6	E. L. Jacob.
Eton	2,806	2	3	..	..	..	..	2	1	..	..	..	..	..	..	..	..	1	1	..	..	8.4	12.6	0.0	4.2	A. J. Southey.
Evesham	4,888	*	5	..	1	..	1	1	2	1	..	..	..	..	..	1	..	..	..	..	..	*	12.0	2.4	0.0	G.H.Fosbroke,jun.,S.Sc.C.Cam.
Failsworth	8,000	*	10	1	..	..	1	2	6	..	..	..	..	..	..	..	..	2	..	..	..	*	14.7	0.0	2.9	G. W. Beattie, M.D.
Farnham	5,000	10	10	5	..	1	..	1	3	3	..	..	..	..	2	..	1	3	..	..	2	23.5	23.5	7.1	7.1	S. G. Sloman, jun.
Fenton	14,000	38	24	11	3	..	2	3	5	6	..	..	..	..	..	1	5	4	..	..	..	32.0	20.2	5.0	3.4	A. V. Griffiths.
Finchley†	11,339	26	6	5	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	29.9	6.9	0.0	0.0	J. Turle, M.D.
Fleetwood	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Porter.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
GARSTON†	8,500	32	11	1	1	1	2	5	1	1	..	..	..	..	..	..	1	1	2	1	..	49.1	16.9	1.5	1.5	J. A. Fisher.
GLOSSOP	18,697	40	43	10	9	3	5	9	7	9	..	1	1	..	..	3	4	6	5	1	..	25.2	27.1	5.7	3.8	J. Rhodes.
GLOUCESTER	37,907	66	59	22	11	4	3	11	8	7	..	..	..	1	1	1	4	14	1	3	9	20.5	18.3	2.2	4.3	J. P. Wilton.
GOOLE	10,205	23	17	4	2	..	..	8	3	4	..	..	..	..	1	..	1	2	..	2	2	26.5	19.6	4.6	1.2	J. Mitchell Wilson, M.B., S.Sc.C.
GORTON†	32,000	107	57	16	14	3	2	11	11	15	..	1	1	2	2	2	2	10	1	..	..	43.6	23.2	6.1	4.1	R. E. Hammond.
GREAT DRIFFIELD	6,033	11	9	6	1	..	..	1	1	..	..	..	..	..	..	..	..	..	1	..	..	21.5	17.6	0.0	0.0	D. Ridpath, M.D.
GUILDFORD	10,167	22	12	3	..	..	..	5	4	2	..	..	..	..	..	1	..	1	1	..	..	25.5	13.9	2.3	0.0	J. Morton, M.B.
HALIFAX	72,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. Ainley.
HANDSWORTH (STAFFORD)	22,630	38	28	7	4	..	1	9	7	7	..	..	..	..	..	..	7	..	3	1	..	19.8	14.6	3.6	0.0	J. B. Welch, M.B.
HARBORNE	6,000	14	5	..	1	..	..	1	3	..	..	..	..	..	..	..	..	1	..	..	3	27.5	9.8	0.0	2.0	R. W. Smith, M.D.
HARWICH	7,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. K. Morgan.
HASLINGDEN†	14,000	28	27	8	6	3	..	5	5	7	..	3	..	..	1	1	2	5	1	1	..	26.1	25.1	6.5	4.7	J. A. Harrison, M.D.
HASTINGS†	39,780	80	64	13	5	2	2	22	20	3	..	..	..	..	1	2	10	6	3	4		26.2	21.0	1.0	3.3	C. Ashenden.
HENDON†	9,297	24	9	5	..	..	..	..	4	1	..	..	..	..	..	..	1	1	..	..	1	33.7	12.6	1.4	1.4	J. Cameron, M.D.
HEYWOOD	25,000	*	53	20	8	6	3	10	6	17	..	..	8	..	..	2	7	9	3	1	..	*	25.0	8.0	4.2	H. Wisken.
HINCKLEY	7,500	17	17	6	5	..	1	2	3	6	..	1	..	..	..	1	4	1	1	..	..	26.7	26.7	9.4	1.6	W. H. Griffiths.
HINDLEY†	12,000	44	21	8	3	1	2	4	3	6	..	..	..	..	..	3	3	2	3	2	..	47.8	22.8	6.5	2.2	J. G. Brayton.
HORWICH	4,315	5	5	..	..	..	..	2	3	..	..	..	..	..	..	..	..	2	1	..	..	13.7	13.7	0.0	5.5	G. H. Whitaker.
HUDDERSFIELD†	81,780	205	147	39	22	4	10	42	30	18	1	3	..	..	1	1	12	26	17	3	13	32.7	23.4	2.9	4.1	J. S. Cameron, M.D., B.Sc.
HULL†	149,627	399	325	107	*	*	*	*	56	65	..	2	8	..	23	6	26	*	2	10	20	34.8	28.3	5.7	*	
HURST	7,000	3	14	2	4	1	1	3	3	3	..	..	2	..	..	..	1	3	2	..	..	5.0	23.5	5.0	5.0	T. Cooke.
HYDE	28,218	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
ILFRACOMBE	5,500	10	6	5	..	..	..	..	1	1	..	..	..	..	..	..	1	1	..	..	..	21.4	12.8	2.1	2.1	E. J. Slade-King, M.D., S.Sc.C.
ILKESTON	12,356	42	27	7	6	1	2	8	3	3	..	..	..	..	..	1	2	4	3	..	..	40.0	25.7	2.9	3.8	R. Wood.
IPSWICH	48,001	116	89	30	12	*	*	*	27	24	..	..	..	..	..	3	21	10	4	1	9	27.8	21.3	5.7	2.4	G. S. Elliston.
KEIGHLEY	24,000	43	30	8	5	1	1	5	10	3	..	..	..	..	..	1	2	3	3	..	..	21.1	14.7	1.5	1.5	A. Roberts.
LEAMINGTON	24,500	54	30	7	4	2	1	5	11	3	..	..	2	..	..	..	1	2	4	..	1	25.0	14.4	1.4	1.0	J. S. Baly.
LEEDS†	318,927	823	506	161	*	*	*	*	82	88	..	3	7	..	9	19	50	*	*	19	40	33.7	20.7	3.6	*	G. Goldie.
LEEK	12,527	32	24	12	2	1	3	1	5	4	..	..	1	..	..	..	3	3	2	..	1	30.1	22.6	3.8	2.8	J. J. Ritchie.
LEICESTER†	129,912	336	299	92	*	*	*	*	45	68	..	18	12	2	..	11	25	*	*	6	29	33.7	30.0	6.8	*	
LEIGH	20,600	57	39	11	8	5	1	8	6	8	..	..	5	..	1	1	1	6	4	3	..	32.6	22.3	4.6	3.4	J. Hall.
LICHFIELD	8,129	15	9	3	2	..	..	3	1	2	..	..	..	1	..	1	..	2	1	1	..	21.7	13.0	2.9	2.9	G. A. Carter, M.D.
LINCOLN	32,103	91	63	12	13	5	7	19	7	13	..	2	2	1	4	1	3	9	10	2	8	33.4	23.1	4.8	3.3	C. Harrison, M.D., S.Sc.C.C.
LITTLEHAMPTON	4,000	5	5	1	..	1	..	1	2	..	..	..	..	..	..	..	..	1	1	..	..	14.7	14.7	0.0	2.9	C. Kelly, M.D.
LIVERPOOL†	544,056	1561	1174	298	298	69	49	313	147	254	..	1	82	7	42	27	95	239	107	36	151	37.4	28.1	6.1	5.7	J. S. Taylor, M.D.
LIVERSEDGE	13,750	33	20	7	4	..	4	3	2	..	..	..	..	..	..	..	..	3	1	..	..	28.3	17.1	0.0	2.6	W. J. Sykes, M.D.
LOUTH	10,750	27	17	5	..	4	..	5	3	6	..	..	..	..	..	2	4	2	1	1	..	29.6	18.6	6.6	2.2	R. Domenichetti, M.D.
LUTON	24,200	71	33	6	10	2	1	5	9	12	..	..	2	3	..	2	5	2	4	..	5	34.5	16.1	5.8	1.0	H. Sworder.
LYTHAM‡	5,000	14	6	2	..	..	..	3	1	..	..	..	..	..	..	..	..	..	1	..	..	29.2	12.5	0.0	0.0	W. E. Pountney, M.B.
MACCLESFIELD	36,641	63	63	15	8	1	4	20	17	4	..	..	..	..	..	2	2	8	7	..	9	20.2	20.9	1.3	2.6	G. Bland.
MAIDENHEAD	8,281	23	8	1	1	1	..	2	3	2	..	..	..	1	..	..	1	..	..	..	1	32.7	11.4	2.8	0.0	W. T. G. Woodforde, M.D.
MAIDSTONE†	29,537	91	31	7	1	3	1	12	7	3	..	..	..	..	..	3	..	1	7	1	..	40.2	13.7	1.3	0.4	M. A. Adams.
MANCHESTER†	363,130	885	643	175	*	*	*	*	94	120	..	20	25	5	10	9	51	*	7	22	100	31.8	23.1	4.3	*	
MERTHYR TYDFIL	52,000	120	139	35	55	8	5	13	23	46	..	46	..	..	..	..	..	13	6	7	3	27.2	31.5	10.4	2.9	T. J. Dyke.
MEXBOROUGH	6,000	14	16	4	2	3	..	4	3	4	..	..	..	..	..	1	1	2	1	..	..	27.5	31.4	7.8	1.9	W. Sykes.

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† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Middlesbrough	58,988	172	105	41	32	9	2	12	9	28	..	7	11	..	5	..	5	18	5	2	6	34.3	21.0	5.6	3.6	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. B. Knott.
Mirfield	12,725	26	24	4	4	2	2	7	5	2	..	..	1	1	..	..	..	7	3	..	..	24.1	22.2	1.9	6.5	W. Marsden.
Morley	12,100	40	32	12	3	4	3	7	3	8	..	..	1	..	..	6	1	7	3	..	..	38.9	31.1	7.8	6.8	S. T. Steele, S.Sc.C.Camb.
Moss-Side	16,500	45	25	6	3	..	1	8	7	5	..	2	..	1	..	1	1	2	4	..	..	32.1	17.8	3.6	1.4	A. E. Sutcliffe.
Neath	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. Ryding, M.D.
Nelson	12,000	25	15	3	4	3	..	2	3	2	..	..	2	..	..	..	..	3	..	..	..	24.5	14.7	2.0	2.9	T. Dean, M.D.
Newark†	13,746	34	25	9	2	2	..	4	8	3	..	..	..	..	..	1	2	6	3	1	4	32.3	23.7	2.8	5.7	A. Ashby, M.B.
Newbury	9,796	20	20	1	1	4	1	6	7	4	..	..	..	..	..	3	1	1	2	3	1	24.0	24.0	4.8	1.2	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	34	31	9	7	1	1	9	4	7	..	..	1	..	..	..	6	5	1	..	..	22.2	20.3	4.6	3.3	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	366	252	76	48	*	*	*	52	27	..	..	7	..	2	3	15	38	25	9	26	31.9	22.0	2.4	3.3	H. E. Armstrong.
Norwich†	85,827	235	154	50	*	*	*	*	37	25	..	..	7	..	2	3	13	*	*	4	13	35.7	23.4	3.8	*	———
Nottingham	173,627	448	320	89	59	15	15	71	70	54	..	1	15	1	12	6	19	54	26	8	25	30.4	21.7	3.7	3.7	E. Seaton, M.D.
Nuneaton	7,400	26	14	5	2	..	2	3	2	4	..	..	..	..	..	3	1	..	1	..	..	41.4	22.3	6.4	0.0	E. Peacock.
Oldham‡	115,413	344	247	61	59	13	14	51	49	53	..	2	18	..	2	4	27	48	26	5	20	31.1	22.3	4.8	4.3	J. M. Sutton, M.D.
Ovenden	8,000	14	11	4	..	..	..	4	3	1	..	..	..	..	..	..	1	2	3	..	..	20.6	16.2	1.5	2.9	J. Steele.
Oxford†	37,500	89	48	7	2	3	4	16	16	4	..	..	..	1	..	..	3	5	6	..	7	30.9	16.7	1.4	1.7	A. Winkfield.
Padiham and Hapton‡	9,000	32	13	5	2	..	1	3	2	3	..	..	1	..	..	..	2	3	2	..	..	37.1	15.1	3.5	3.5	J. G. Booth.
Pembroke	15,000	33	28	6	2	4	2	9	5	2	..	..	..	..	1	..	1	3	3	1	..	25.9	22.0	1.6	2.4	D. P. Saer.
Penzance	12,000	21	14	5	..	1	2	3	3	1	..	..	..	..	..	..	1	1	..	1	..	20.6	13.7	1.0	1.0	G. B. Millett.
Peterborough‡	20,000	57	34	12	1	..	2	13	6	5	..	..	..	..	..	2	3	3	5	2	1	29.7	17.7	2.6	1.6	W. S. Thomson, M.D.
Plymouth†	74,993	188	122	27	10	8	9	37	31	14	..	..	1	4	..	3	6	17	14	3	8	32.7	21.2	2.4	3.0	H. Greenway.
Pontypool	5,100	11	3	1	..	..	..	1	1	..	..	..	..	..	..	..	..	2	..	..	..	25.4	6.9	0.0	4.6	S. B. Mason.
Poole	11,350	30	15	3	1	..	2	6	3	2	..	..	..	..	..	2	..	2	1	..	1	31.1	15.6	2.1	2.1	H. A. Lawton.
Portsmouth†	134,224	305	212	48	*	*	*	*	57	29	..	1	..	2	8	7	11	*	*	7	16	29.6	20.6	2.8	*	———
Preston‡	88,000	290	229	73	51	18	11	42	34	66	..	..	2	..	2	20	42	30	17	3	3	34.4	27.1	7.8	3.6	H. O. Pilkington.
Ramsgate†	22,200	61	40	8	6	..	2	13	11	6	..	..	1	..	..	2	3	7	4	..	..	35.8	23.5	3.5	4.1	E. Walford.
Ravensthorpe (Yorks.)	4,560	10	7	2	1	..	1	2	1	1	..	..	1	..	..	..	...	3	1	..	..	25.8	18.1	2.6	7.8	W. Marsden.
Rawmarsh	9,652	24	20	5	11	..	2	..	2	11	..	1	1	..	5	1	3	2	3	..	..	29.3	24.4	13.4	2.4	W. J. Smith.
Reading†	41,500	124	55	21	10	2	..	9	13	5	..	2	..	1	..	..	2	12	4	3	10	38.9	17.3	1.6	3.8	J. Shea, B.A., M.D.
Redditch	10,070	*	20	6	3	1	1	7	2	2	..	..	1	..	..	..	1	2	3	..	..	*	23.4	2.3	2.3	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	18	14	6	..	..	1	3	4	2	..	..	..	..	..	..	2	2	..	..	..	22.3	17.3	2.5	2.5	J. S. Hichens.
Reigate	18,000	*	15	4	4	1	..	3	3	2	..	..	..	..	..	..	2	1	1	..	..	*	9.8	1.1	0.7	E. I. Jacob.
Richmond (Surrey)†	19,500	34	31	9	2	2	2	4	12	3	..	..	1	..	2	..	..	2	2	1	4	22.7	20.7	2.0	1.3	J. T. Rowland, M.D.
Rochdale	72,720	137	132	32	36	7	6	28	23	20	..	..	8	..	1	5	5	22	9	1	..	22.2	21.4	3.2	3.6	J. Henry, M.D.
Rochester	18,500	49	26	6	1	..	3	5	11	1	..	1	..	..	..	..	..	4	1	1	8	31.2	16.6	0.6	2.5	J. Sladen-Knight, M.D.
Romsey	4,481	4	5	3	1	..	..	1	..	2	..	..	..	..	..	..	2	2	..	..	..	10.5	13.1	5.2	5.2	F. Buckell.
Rotherham†	34,404	83	54	19	11	2	3	9	10	6	..	..	3	..	1	1	1	8	3	..	4	31.5	20.5	2.3	3.0	J. Hardwicke, M.D.
Rowley Regis	27,000	99	34	13	13	2	..	3	3	5	..	..	..	..	..	1	4	8	..	1	..	43.2	14.8	2.2	3.5	J. G. Beasley.
Rugby	8,916	17	9	1	1	..	1	4	2	1	..	..	1	..	..	..	..	..	2	1	..	22.5	11.9	1.3	0.0	G. Wilson, M.D.
Runcorn	14,000	46	26	8	10	1	..	8	6	3	..	..	..	..	..	1	2	5	1	1	..	38.7	21.9	2.5	4.2	R. H. Mouritz.
Rusholme†	12,500	26	8	5	..	..	1	1	1	1	..	..	..	..	..	..	1	1	..	..	..	27.1	8.3	1.0	1.0	J. Gregory.
Ryde	12,800	*	19	1	4	1	1	5	7	2	..	..	..	..	..	..	2	4	1	1	1	*	17.5	1.8	3.7	A. Platt Wilks, M.B.
Saffron Walden	5,942	14	14	3	..	..	1	2	8	..	..	..	..	..	..	..	..	4	3	..	3	27.7	27.7	0.0	7.9	W. Armistead, M.B.
Salford†	185,786	505	404	122	110	25	17	88	42	104	..	11	24	1	4	20	44	83	36	10	37	35.4	28.3	7.3	5.8	J. Tatham, M.D., S.Sc.C.Camb.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged: 0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Deaths from: Seven principal zymotic diseases	Small-pox	Measles	Scarlet Fever	Diphtheria	Whooping-Cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence.	Deaths in Public Institutions.	Annual rate per 1,000 persons living: Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	Medical Officers of Health.
SELBY	5,720	17	13	2	3	1	1	5	1	3	..	..	..	..	..	1	2	3	2	..	1	33.7	25.7	5.9	5.9	J. M. Wilson, M.B., S.Sc.C.C.
SHEFFIELD‡	304,938	1018	557	159	115	*	*	*	99	95	..	7	6	3	10	12	57	147	34	5	43	34.8	19.0	3.2	5.0	T. W. Hime, B.A., M.B.
IRLEY	7,000	15	18	6	2	..	2	4	4	5	..	3	..	..	..	..	2	2	1	..	..	25.2	30.3	8.4	3.4	J. H. Allden.
SITTINGBOURNE‡	9,000	34	12	3	1	..	1	1	6	1	..	..	1	..	..	..	..	1	..	..	..	39.4	13.9	1.2	1.2	H. G. Sutton.
SLOUGH	5,890	10	3	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	20.0	6.0	0.0	0.0	A. J. Southey.
SMETHWICK	21,000	90	34	10	10	..	1	3	10	8	..	..	..	..	..	1	7	4	4	..	..	50.4	19.1	4.5	2.2	W. Sutton.
SOUTHPORT	34,100	85	42	6	5	3	3	11	14	3	..	..	1	..	..	1	1	9	4	1	2	29.4	14.5§	1.0	3.1	H. H. Vernon, M.D.
STALYBRIDGE	23,405	50	48	13	8	2	3	10	12	8	..	..	..	..	..	2	6	14	3	..	..	25.2	24.1	4.0	7.0	F. J. Roberts-Dudley.
STOURBRIDGE	9,376	20	7	2	..	..	1	1	3	..	..	..	..	..	..	..	..	2	1	..	..	25.1	8.8	0.0	2.5	R. Eagar, M.D.
STRATFORD-ON-AVON	7,899	*	17	5	1	2	..	3	6	2	..	..	..	..	..	..	2	2	1	..	4	*	25.3	3.0	3.0	G. H. Fosbroke, S. Sc. C. Camb.
STROUD	7,608	22	11	4	1	1	..	2	3	4	..	..	..	..	..	..	..	4	1	1	7	34.1	17.0	6.2	1.5	T. Partridge.
SUNDERLAND†	116,730	273	234	57	*	*	*	*	35	77	..	3	42	1	2	4	25	*	*	4	8	30.5	26.2	8.6	*	H. J. Yeld, M.D.
SWANSEA	65,890	192	92	33	15	4	5	20	15	13	..	..	7	..	..	3	3	19	10	2	5	34.3	16.4	2.3	3.4	E. Davies.
SWINTON†	7,753	27	18	11	4	1	1	1	..	..	..	..	..	..	..	..	..	4	..	1	..	45.4	30.3	0.0	6.7	C. S. Blythman, M.B.
TAMWORTH	4,846	11	10	1	2	..	3	1	3	2	..	..	1	..	..	1	..	1	1	..	1	26.7	24.3	4.9	2.4	H. J. Fausset, M.D.
TAUNTON	16,227	36	27	3	3	1	3	7	10	3	..	..	..	..	2	..	1	2	5	..	6	26.1	19.6	2.2	1.5	H. J. Alford, M.D.
TEIGNMOUTH	7,250	17	5	..	..	..	..	1	4	..	..	..	..	..	..	..	..	2	..	..	..	27.6	8.1	0.0	3.2	W. C. Lake, M.D.
TEWKESBURY	5,500	10	6	1	3	..	..	1	1	2	..	..	..	..	..	..	2	..	..	..	..	21.4	12.8	4.3	0.0	W. Allard.
TIVERTON‡	10,400	23	22	4	3	1	2	6	6	4	..	..	..	..	..	2	2	4	2	..	2	23.1	22.1	4.0	4.0	J. P. McNeill, M.D.
TORQUAY‡	26,000	*	31	3	1	1	3	8	15	2	..	..	..	..	..	1	1	3	..	1	2	*	12.4	0.8	1.2	P. Q. Karkeek.
TOTTENHAM†	37,000	149	52	19	8	3	3	14	5	10	..	2	..	2	..	4	2	7	5	..	3	52.5	18.3	3.5	2.5	C. T. Conolly.
TOXTETH PARK†	8,000	20	7	..	4	..	..	1	2	1	..	..	..	..	..	..	1	4	..	..	..	32.6	11.4	1.6	6.5	J. McClelland, M.D.
TREDEGAR	18,000	39	37	9	10	2	3	7	6	9	..	7	..	..	..	..	2	8	3	2	3	25.5	24.2	5.9	5.2	G. A. Brown.
TROWBRIDGE†	12,000	22	28	11	8	1	..	3	5	15	..	11	1	..	..	..	3	2	2	..	..	23.9	30.4	16.3	2.2	G. C. Taylor, M.D.
TRURO	11,000	19	20	4	4	..	1	3	8	4	..	..	..	..	1	1	2	1	..	..	1	20.3	21.4	4.3	1.1	E. Sharp.
TUNSTALL†	15,500	45	34	10	14	..	1	4	5	4	..	..	1	..	..	..	4	6	..	1	..	37.8	28.6	3.4	5.0	J. P. Edwards.
ULVERSTON	11,000	29	13	2	..	1	1	7	2	2	..	..	..	..	1	1	..	4	3	1	2	31.0	13.9	2.1	4.3	A. Thompson, M.D.
WALKER-ON-TYNE	8,000	31	23	5	7	2	1	5	3	4	..	4	..	..	..	..	..	3	2	1	..	45.7	33.9	5.9	4.4	H. F. Hurst.
WALLASEY†	23,000	53	21	7	5	..	1	5	3	4	..	2	..	..	2	..	..	5	1	3	1	30.0	11.9	2.3	2.8	I. Byerley.
WARMINSTER	5,786	11	5	1	2	..	..	..	2	1	..	..	..	..	..	1	..	..	..	..	..	22.4	10.2	2.0	0.0	P. Grubb.
WARRINGTON†	40,000	154	92	32	13	3	5	23	16	9	..	1	3	1	..	2	2	14	5	2	15	45.3	27.1	2.6	4.1	G. W. Joseph.
WEDNESBURY†	26,000	64	30	8	8	..	1	8	5	11	..	..	1	..	..	4	6	3	1	1	..	32.1	15.0	5.5	1.5	J. C. Garman.
WEST BROMWICH†	54,000	161	93	27	25	*	*	*	19	16	..	..	1	1	..	1	13	*	..	5	1	38.9	22.5	3.9	*	J. Manley.
WEST DERBY	33,693	69	46	13	9	3	5	7	9	8	..	..	1	..	2	2	3	5	2	..	..	24.1	16.1	2.8	1.7	W. Carter, M.D.
WESTON-SUPER-MARE	14,000	30	19	4	..	1	1	8	5	..	..	..	..	..	..	..	..	2	3	2	3	25.2	16.0	0.0	1.7	C. V. Hitchins.
WEYMOUTH	15,269	27	24	11	2	1	2	3	5	4	..	..	..	..	..	..	4	2	3	..	3	20.8	18.5	3.1	1.5	H. Tizard, M.D.
WIDNES	22,000	113	29	13	5	2	1	4	4	3	..	..	..	..	..	..	3	6	..	1	..	60.5	15.5	1.6	3.2	W. Cooper.
WILLENHALL†	19,300	43	29	7	10	6	1	3	2	13	..	..	10	..	2	..	1	1	1	1	..	29.0	19.6	8.8	0.7	W. H. Hartill.
WITHINGTON‡	15,000	32	15	1	2	1	..	7	4	2	..	..	..	1	..	1	..	3	3	..	1	22.3	10.4	1.4	2.1	T. C. Railton, M.B.
WOLBOROUGH	7,300	*	12	3	2	..	..	5	2	..	..	..	..	..	..	..	..	1	3	1	..	*	19.4	0.0	1.6	L. Armstrong.
WOLVERHAMPTON‡	76,000	276	160	47	37	8	6	29	33	35	..	1	5	1	4	3	21	29	10	9	24	37.9	22.0	4.8	4.0	J. H. Love.
WOMBWELL†	7,500	32	18	7	7	..	1	1	2	3	..	..	1	..	..	..	2	..	1	..	..	55.7	31.3	5.2	0.0	J. N. Millar, M.B.
WORKINGTON†	10,000	*	12	5	..	..	2	4	1	2	..	..	..	1	..	..	1	2	1	..	..	*	15.6	2.6	2.6	J. Ward, M.D.
WORTHING	9,540	17	15	5	1	1	2	4	4	3	..	..	..	..	..	1	2	..	2	1	1	21.0	18.5	3.7	0.0	C. Kelly, M.D.
YORK	46,850	119	87	20	10	1	7	25	24	15	..	..	..	..	5	5	5	9	10	2	4	33.1	22.6	3.9	2.3	S. W. North.

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‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 12.46.

Of these, no less than 214 were returned in time for insertion in the accompanying table of the information furnished thereon. The estimated population of the sanitary districts for which we publish October statistics is about seven and a half millions, and including London and its outer ring of suburban districts, the aggregate population here dealt with is little short of twelve millions, and nearly half the entire population of England and Wales. The birth-rate in those districts furnishing this information averaged 32.5 per 1,000, against rates declining from 37.7 to 34.1 in the four preceding months. Exceptionally low birth-rates (under 21 per 1,000) prevailed last month in Bridgnorth, Bath, Handsworth, Truro, Penzance, and Macclesfield. Rates, on the other hand, exceeding 46 per 1,000, were returned in Garston, Chiswick, Smethwick, Tottenham, Wombwell, and Widnes. Some of these high birth-rates suggest the probability of an under-estimate of the present population of the sanitary districts.

The annual death-rate in the aggregate of the 214 sanitary districts averaged 18.0 per 1,000 of the estimated population, showing a marked decrease from the rate that prevailed in the preceding month, which was 26.2 per 1,000. The average death-rate during last month in the twenty large towns, including London, was, as before stated, 22.1 per 1,000; it follows, therefore, that the rate in the smaller towns was very considerably lower than that which prevailed in the larger towns. Very low death-rates, under 10 per 1,000, prevailed during October in the following sanitary districts:—Finchley, Pontypool, Braintree, Brownhills, Teignmouth, Rusholme, Ebbw Vale, Chiswick, Acton, and Consett. Death-rates, on the other hand, exceeding 31 per 1,000, were recorded in Wombwell, Morley, Mexborough, Merthyr Tydfil, Walton-on-Tyne, Cirencester, and Audenshaw. Most of these high death-rates were due to exceptional zymotic fatality. The annual death-rate from the seven principal zymotic diseases in the 214 sanitary districts averaged 3.9 per 1,000, against rates increasing steadily from 2.6 to 8.7 in the four preceding months. Excluding diarrhœa (which caused a death-rate of 1.8 per 1,000), the rate from the six other zymotic diseases was equal to 2.1 per 1,000, which, although below the average, showed a slight increase upon the low rate that prevailed in the previous month. No death was referred to any of the seven zymotic diseases last month in 30 of the 214 sanitary districts; while the zymotic death-rate showed a marked excess, and was above 9 per 1,000, in Hinckley, Audenshaw, Droylesden, Cirencester, Rawmarsh, Merthyr-Tydfil, Dawlish, and Trowbridge.

The fatality of diarrhœa was considerably lower than that which prevailed during September; it showed, however, a marked excess in Ashton-under-Lyne, Burnley, Cirencester, Preston, and West Bromwich. Only four fatal cases of small-pox were registered during October among the seven and a half millions of persons living in the urban sanitary districts dealt with in our table; these corresponded with the number returned in the preceding month, and included one each in Bury, Huddersfield, Burton-upon-Trent, and Beccles. Measles fatality showed a somewhat general increase during last month, and was exceptionally severe in Merthyr-Tydfil, Trowbridge, and Dawlish. The fatal cases of scarlet fever were proportionally numerous in Coventry, Heywood, Middlesborough, and Willenhall. Diphtheria caused 5 deaths in Croydon, 3 in Cardiff, and 3 in Luton. The deaths referred to fever, principally enteric, showed a large proportional excess in Preston, Newbury, Morley, Crewe, Louth, Tottenham, Wednesbury, Bootle, and York. In Preston no less than 20 deaths were referred to enteric fever, equal to an annual rate of 2.5 per 1,000, showing a marked increase upon the fever fatality in the previous month.

The annual death-rate from diseases of the respiritory organs, including phthisis, average 3.5 per 1,000 persons living in those sanitary districts for which the information is available, against 2.3 and 2.5 in the three preceding months. The rate from those diseases, however, exceeded 6 per 1,000 in Belgrave, Bradford (Lancashire), Farnham, Mirfield, Morley, Ravensthrope, Saffron Walden, Stalybridge, and Swinton. In small sanitary districts, however, thoroughly trustworthy rates for comparative purposes can only be obtained from the mean results for several months.

Infant mortality, measured by the proportion of deaths under one year to births registered, showed a marked decline in October from that which prevailed in previous months; it averaged 186 per 1,000, against 276 and 290 in August and September. In the twenty large towns, the death-rate of infants averaged 174 per 1,000, against proportions of 190, 276 and 246 in the three preceding months. Infant mortality during October did not exceed 157 in London, whereas it averaged 192 in the nineteen large provincial towns; the proportion in those nineteen towns ranged from 144 and 157 in Plymouth and Portsmouth, to 242 in Manchester, 268 in Hull, and 274 in Leicester. Among the smaller urban sanitary districts, infant mortality showed a proportionally large excess in Bury, Glossop, Gloucester, Merthyr Tydfil, Morley, and Preston. The rate of infant mortality in Preston has showed a marked excess during the past four months. The high rate in Merthyr Tydfil was due to the exceptionally fatal epidemic of measles.

Our table of October statistics includes the following fifteen watering-places or health-resorts: Brighton, Dawlish, Dover, Eastbourne, Hastings, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, and Worthing. The usual return from Bangor has not been received, owing to delay caused by the death of the local registrar; and that from Weymouth has also not come to hand. The annual death-rate in these fifteen watering-places during October, averaged 17.8 per 1,000 against 20.3 and 22.8 in the two preceding months; the zymotic death-rate did not exceed 2.1, and was less than the rate that prevailed during August and September, when infantile diarrhœa caused an excess. The death-rate from diseases of the respiratory organs during October in these watering places, exclusive of Brighton, for which we do not yet receive this information, was equal to 2.5 per 1,000, and was 1.0 below the average rate in all the sanitary districts. These statistics afford on the whole satisfactory evidence of the sanitary condition of these fifteen health resorts.

In once more acknowledging our obligations to Medical Officers of Health for their co-operation, without which the prompt publication of these monthly mortality statistics would be impossible, our thanks are especially due for the receipt of 112 of the cards on or before the 5th inst., which materially facilitated the labour of preparing our table for publication. It is eminently satisfactory to be able to note

that of our 219 previous contributors only 9 failed to furnish their cards in time for publication, and in most of these cases the failure arose from circumstances beyond their control. The present table contains returns from 10 urban sanitary districts which appear for the first time, among which may be mentioned Crewe, Ebbw Vale, Hastings, and Handsworth, the estimated population of each of which is 17,000 and upwards.

SPECIAL REPORTS.

THE PREVENTION OF SMOKE AND THE DIMINUTION OF FOG IN GREAT CITIES.

A MEETING of the Fog and Smoke Committee in connection with the National Health and Kyrle Societies, was held on Oct. 20, at the National Health Society's rooms, 44, Berners Street; Mr. Ernest Hart, chairman of the Council of the National Health Society, in the chair. Among those who were present, were Mr. J. L. Whittle, Mr. Statham, Mr. Hoole, Mr. Wynter Blyth, Miss Octavia Hill, Miss Kate Potter, Miss Le Fevre and Miss York. Letters were read from a number of gentlemen, who spoke of their great sympathy with the movement; many of them being unable to attend, expressed a desire to have their names added to the committee; other letters contained practical suggestions for the assistance of the committee in their undertaking. Mr. W. Chandler Roberts, Dr. Alfred Carpenter (Croydon), Dr. Siemens, Dr. Percy (School of Mines), Dr. Frankland, F.R.S., Capt. Galton, C.B., F.R.S., Lieut.-Col. Grey, Messrs. W. R. E. Coles, J. Grasswood (Swansea), W. Hale White (Carsharlton), Frederick Bravender (Cirencester), Richard W. Perkins (Talgarth), G. N. Shaw (Lyme Regis), Henry Carr (London) Sydney Robins (London), Thomas Cornish, M.E. (London), W. H. Brown, R. N. (Lyme Regis), Robert James (Lambeth), F. Baker (London), were among the correspondents.

Dr. PERCY, F.R.S. (School of Mines), called attention to an article written by him, which appeared in the *Quarterly Review*, April 1866, No. 238, under the title 'Coal and Smoke', and related that some years ago he tried (during the recess) an experiment on a moderate scale at the Houses of Parliament, on the filtration of a foggy atmosphere through cotton wool. The result was remarkable. He was of opinion that it was possible to extract by that means the greater part of the matter constituting fog. Prevention was, however, obviously the problem of the day.

Lieut.-Col. GREY recommended the substitution of anthracite coal, citing what was done in America and Canada in support of his view.

Mr. W. H. BROWN (R.N.) submitted for the Committee's inspection the plan of a chimney with eight separate compartments for the collection of mere soot —three times as much as at present; with no difficulty in sweeping, and little cost. Also, he further submitted plans of a portable revolving grate, which he had himself in use, and for which he claimed the following advantages. (1) Consuming not only smoke but flame. (2.) Economising fuel; its contents, by receiving draught all round it, rapidly become red hot, as does the entire grate, giving out great heat. (3.) Having a cinder-shelf close under it to receive the hot cinders, retaining them until consumed to dust, when they fall through a perforated bottom into the ash-hole.

Mr. RICHARD W. PERKINS stated it to be well known that anthracite coal was absolutely smokeless. The only questions that remained for consideration were: (1.) The comparative cost. (2.) Its applicability as a steam generating fuel. Some twenty-five years ago he had been the means of introducing that coal, to comparatively a considerable extent, into the metropolis, for use in steam boiler furnaces, and Messrs. John Halls and Sons, gunpowder manufacturers, to whose notice he had introduced it, had reported of anthracite as compared with north country coal—presuming the cost of both to be equal—that it effected a saving of 25 per cent; a statement more or less confirmed by the experience of the use of that coal in Her Majesty's dockyard. One difficulty, however, which presented itself was the fact that with ordinary chimney draught, and when steam boilers were worked up to their full evaporative power, anthracite would not evaporate more than from three-fourths to four-fifths of water that would be effected by the best steam coals in the same time. This was a difficulty completely overcome by an impelled blast. He had brought the matter before Sir E. J. Reed, who had instructed Mr. J. F. Flannery, Consulting Engineer, of 9 Fenchurch street, to inspect and report on a series of trials he was making at Swansea, which proved that the evaporative efficiency of boilers was increased 50 per cent. whether anthracite or steam coal was the fuel employed. This has been proved by other experiments, and had formed the subject of a paper read before the Association of Naval Architects in March last. Mr. C. H. Perkins (a brother of the writer) had read a paper before the British Association in August last, on the subject of anthracite coal, and its use as a fuel for domestic purposes, which would be published in the Society's report.

Mr. HENRY CARR suggested in reference to domestic arrangements, a reduction of rates as a premium for the domestic consumption of smoke, eventually culminating in a fine on those who did not consume their smoke. He had made stoves to his own pattern, consisting of the ordinary brick surrounding the fire and a solid bottom, the advantages being a flap register at the back, which could be easily regulated, gave slow combustion, and avoided draughts in the room.

Mr. FREDK. BRAVENDER, speaking of anthracite, said the difficulty was to get it to burn. The plan he recommended was the adoption of a hood to fix or hang on the ordinary fire-grates and so to convert them into temporary stoves during foggy weather. This was easy of accomplishment, and within the power of any ordinary blacksmith to effect.

Mr. G. N. SHORE recommended an invention of his own which he had in operation—a simple and inexpensive arrangement, by means of which the smoke descended through the fire and was burnt—the fire-bars were rotatory tubes through which the air passed for the combustion. Any fuel could be used, the economy was immense and any conservatory and residence could be heated by this invention.

Mr. THOMAS CORNISH, C.E., recommended that a series of high chimney-stacks should be built in the Metropolis, say from 300 to 500 ft. high, the distances between each to be determined after experiment. That the chimney-tops of houses within a certain radius should be connected with the central chimney-stacks by means of pipes running along the tops of the houses, on the same principle that gas

and water are distributed over and underground. A smoke-consumer could be affixed to each main chimney-stack, thus making one chimney and one smoke-consumer answer the purpose for a number of houses at once. Sewer gas could also be conveyed by pipes into the same main chimney stacks, and be discharged in the air several hundred feet above the heads of the inhabitants.

Mr. W. R. E. COLES recommended the adoption of anthracite coal, stating that it was demonstrated at the last meeting of the British Association that works could be carried on with perfect facility by using entirely smokeless coals by means of the proper appliances.

Mr. W. HALE WHITE, Assistant Director of Contracts at the Admiralty, stated that the Welsh smokeless if not too anthracitical, would burn in any well-constructed open grate, but was not suited for the modern form of kitchener. This was constructed on a wrong principle which had contributed greatly to poison the London atmosphere, the very great draught forcing masses of solid carbon into the air.

The CHAIRMAN reported that he had been asked by the Secretary of the Society of Arts to read a paper on the subject on December 4th, but had suggested that Dr. Carpenter be invited to do so, he having special views to advance, whilst he (the Chairman) would be glad to contribute a more critical review of various plans before him. Having seen the necessity of having a review of the legal situation before the committee, he had written to Mr. J. Lowry Whittle and Mr. B. L. Mosely on the subject. These gentlemen, who now of their committee, would no doubt assist them in looking up the legal part of the question.

Miss OCTAVIA HILL thought it was one of the first things to be done to get gentlemen who would undertake to look into the whole question of the present state of the law.

The CHAIRMAN said, not only would they look into the law question, but into the question of inspection and the reports of the inspectors, ascertain what inspections were made, and also glean from personal communication with the inspectors, what were the impediments they found in efficiently carrying out the law, and how it was that the law was so imperfectly enforced.

Miss OCTAVIA HILL stated that she had received a letter from a lady, who said that she was in communication with a French gentleman, M. Bombonnel, who alleged he had made an important discovery of a new fuel he had just patented in London and in Paris—a simple and admirable substitute for wood and coal, which possessed the following features. It was adapted to a portable stove; it could be instantaneously lighted and extinguished; was entirely free from dust, dirt, or smoke; could be arranged on the largest or smallest scale, and lighted or extinguished as easily as a candle; there was no waste; the stove could be an open one, and, consequently, it had nothing in common with a gas or oil stove; the fuel was adaptable to our present stoves, and had the appearance of a blazing red fire. A number of scientific men had testified to its advantages. It was suitable for all domestic purposes, and especially for the poor.

Mr. WYNTER BLYTH wished to know the price of this new fuel per ton, which was, he contended, an important feature.

Miss HILL could not tell, but it had been urged that it was suitable for the poor.

The CHAIRMAN directed attention to an excellent article which had appeared in the *Builder*, which alleged that the problem might be solved by using in fire grates a coal from which only a portion of the gas had been extracted by gas factories, sufficient to render it smokeless. He also read the letter of Dr. Percy, who was an eminent metallurgist; and it was decided to write to him asking him to make some notes on coal and smoke, and to attend their next meeting and give them the information in his power.

Mr. WYNTER BLYTH suggested getting a gas company to charge one of their retorts for a short time and then to take out the stuff and quench it, when it might serve to experiment with.

Mr. STATHAM, on being asked by the Chairman, undertook to put himself into communication with the gentleman who wrote the article in the *Builder* and ask him to assist in practically testing his suggestion.

The question as to the great quantity of smoke arising from steamers was then referred to and also the law affecting them. It was decided to get a copy of the Smoke Act and other documents bearing upon this, and Mr. J. L. Whittle consented to look into the law upon the subject.

It was proposed by the Chairman, and agreed to, to nominate a Sub-committee of Experts; the following gentlemen to be asked to form the said Committee:—Dr. Siemens, F.R.S., Prof. Chandler Roberts, F.R.S., Capt. Galton, F.R.S., Mr. Hoole, C.E., Mr. Statham, and Mr. Eassie, C.E.

It was agreed to suggest to the proprietors of the Agricultural Hall, that they have an Exhibition of Smoke-Prevention Apparatus.

The subject of cooking by gas was discussed. Mr. Wynter Blyth stated that at the Darenth Asylum they cooked almost entirely by gas. Mr. J. L. Whittle said that for this purpose it was not necessary to have gas of such an expensive quality as that used for illuminating purposes.

It was decided that the communications received from Mr. G. N. Shore, Mr. R. James, Mr. T. Cornish, C.E., and Mr. W. H. Brown, R.N., be referred to the Committee of Experts, and that a letter be written to Mr. W. R. E. Coles, asking for further information relative to the smokeless coal recommended in his communication.

A second meeting of the Fog and Smoke Committee of the National Health and Kyrle Societies was held on the 27th ult., Mr. Ernest Hart in the chair. Among those present were Prof. Chandler Roberts, Mr. Edwin Chadwick, C.B., Dr. Wyld, Mr. J. L. Whittle, Mr. B. L. Mosely, Mr. H. Saxon Snell, C.E., Mr. W. R. E. Coles, Mr. Owen Thomas, Mr. Fowler, Mr. Moberley, Miss Octavia Hill, Miss Kate Potter, Miss Le Fevre, and Miss H. York. Communications were received from the following gentlemen who desired to be enrolled as members of the committee—Sir Frederick Pollock, Mr. Macfarlane, M.P., Prof. Huntington (King's College), Mr. Eassie, C.E., and Mr. Aitchison.

The Rev. D. JONES, Llangandemer Vicarage, Kidwelly, stated he had used the smokeless coal found in his locality in open grates and close kitchen stoves with satisfactory results, as to (1) heat evolved, (2) freedom from dust and soot, (3) the absence of unpleasant smells, (4) small first cost, (5) lasting quality. The conditions requisite are a good draught in the flue and brick at the side and back of fire. There was an absence of smoke after the fire was first lighted.

Mr. J. W. ROBERTSON (16, Sumner Place, Onslow

Square) drew the attention of the Committee to a new smokeless stove, which was fully described and illustrated in the *Illustrated Journal* of Berlin.

Mr. S. J. BAILEY (The Oullwyn and Dulais Collieries) recommended anthracite coal, which the above Colliery Co. were ready to supply delivered in any part of London at 16s. per ton.

Mr. ROBERT PORTER (Dashwood House, New Broad Street), wrote informing the committee that the Trimsaran Colliery Co. intended sending a sample of their coals for experiment.

In reply to requests sent out by the committee, the following gentlemen sent detailed plans of previous suggestions.

Mr. FREDK. BRAVENDER (Cirencester), Mr. W. H. Brown, R.N. (Lyme Regis), and Mr. G. N. Shore (Lyme Regis). The whole of these communications were referred to the sub-committee of experts for consideration.

Mr. J. P. FLANNERY (9, Fenchurch Street), Mr. W. H. LE FEVRE (26, Budge Row, Cannon Street), on behalf of himself and the Balloon Society, Mr. JOHN YOUNG (35, King Street, E.C.). Mr. FRED. EDWARDS, jun., (Great Marlborough Street), and Mr. T. C. HORSFALL, (Alderley), all expressed their great interest in the matter, and willing co-operation.

Mr. W. R. E. COLES, who attended for the purpose of reporting on the qualities of the anthracite coal, said in reply to questions from the chairman and others, there were many kinds of smokeless coal. Anthracite was one, and was found in the coal-fields of Glamorganshire and Carmarthenshire, chiefly in the latter. It contained from 83 to 93 per cent. of carbon. He was of opinion that the supply would be quite adequate to meet all demands. The cost of anthracite would be at the pit's mouth, 5s. to 7s. 6d. per ton; delivered in London within a radius of three or four miles, about 20s. As a matter of economy there would be considerable saving. The conditions required for its use, were (1) draught, (2) regular sized pieces, and that the fire should not be stirred. To meet the difficulty of a defective draught, he suggested a blower or hood from the top down to the first or second bar. This blower could be hung on or (as used in Paris) drawn down like a blind. As a rule it would not burn so well in a small grate as in a large one. Mr. Coles exhibited a specimen of smokeless fuel made by Mr. J. N. Moore, of the Dynevor Collieries, which could be burned in open grates, and undertook to get a sample for the purpose of experiment.

Mr. OWEN THOMAS said in Carmarthenshire anthracite coal was burnt by the peasantry at a cost of not more than a halfpenny a day.

Mr. COLES was of opinion that fires such as were made by the Welsh peasantry would hardly be satisfactory to the London poor. He thought there would be little difficulty in inducing manufacturers to burn smokeless coal in their factories, and to this end he recommended that some members of firms be invited to join the committee, where they would prove valuable allies. He was not aware of any law in France compelling the use of smokeless coal, but thought the use of it there was much on the increase, but for cooking purposes they used a Scotch coal. The chief reason for the non-adoption of smokeless coal by manufacturers in preference to the bituminous coal, was the far greater price of the former, for which they would have to pay from 15s. to 17s. per ton, against 8s. or 9s. per ton, which they were paying at the present time for bituminous coal; and the state of the law, which was most imperfectly administered. A great many of the factories in the metropolis were very deficient of draught. He was acquainted with some works at Lewisham which had hitherto burned bituminous coal, but who now burned anthracite by using Williams' oxy-hydrogen jets, which were highly effectual for the purpose. It was not a question of consuming smoke, but a question of consuming the coal in a way not to produce smoke.

Mr. FOLEY (Rugby) spoke of the use of anthracite coal in Cardiganshire and Pembrokeshire. The peasantry mixed it with clay or mud from the river, into the form of balls, and these balls produced in an hour a bright and cheerful fire, which did not require stirring throughout the day. The quality used was that called *culm*. The great secret in the use of anthracite coal was, that it required to be used in a size suitable to the requirements. It was often put on in pieces of too large a size, and did not burn fast enough. In America it was the common fuel; they made it in different sizes, and the purchaser chose a size suited to his requirements. With a small fire it was necessary to use small pieces. He was of opinion it could be broken up into suitable sizes, and sold at about 16s. or 17s. per ton in London. He had used it in his own residence, in pieces the size of an egg, which had been found to burn freely. There was no difficulty in burning it by means of a blower. He recommended the use of an upright bar. In Pembrokeshire, for boilers, they universally used the culm, or dust, moistened with a little clay and water. These coals were obtainable in Pembrokeshire, Glamorganshire, and Carmarthenshire. There was, perhaps, not an unlimited supply of this coal, but there were seams some thousands of feet in thickness, and extending eighty miles long by twenty broad; a supply which would meet all the demands of the Metropolis for very many years to come. It was suggested that they should have to consider the question of using a more popular conglomerated coal for housekeeping, which would be a free burning coal with all the advantages of anthracite; a patent fuel based on anthracite, that would be a popular coal.

Mr. B. L. MOSELY asked what was the effect of mixing chalk with the coal, a practice resorted to by the railway companies during the late panic.

Mr. COLES said it would practically be of no use, unless coal was at famine prices. Coke was used in factories, which, though smokeless, gave off other vapours. In reply to Mr. Moseley, Mr. Coles said there was no regular factory inspection.

Mr. OWEN THOMAS had received a communication from the Secretary of the united association of proprietors of anthracite collieries, stating that they intended to make an offer to the Association of setting up at different centres of the metropolis grates such as those used in houses, for the purpose of demonstrating to the public that anthracite coal was adaptable for domestic purposes in open grates. The different railway stations were suggested as suitable centres.

Mr. CHADWICK, C.B., referred to an exhibition of gas stoves, held by the Society of Arts, which produced very good results; and thought they would co-operate with the Association in promoting the object in view.

The CHAIRMAN said that experience hitherto had proved that gas stoves, however useful for cooking purposes, were not suitable for living rooms, and referred to a new gas cooking stove exhibited by Mr. Fletcher, of Warrington, at the Glasgow Exhibition, which included improvements well worthy of attention.

Dr. WYLD said Dr. Langdon Down had a large

institution at Kingston-on-Thames, where the whole of the cooking for two hundred people was done by gas.

Mr. J. L. WHITTLE, who had been asked at the previous meeting to draw up a report on the present state of the law affecting smoke, etc., now presented his report. He cited the provisions of the Public Health Act of 1875, which only affected furnaces and factories, and did not include dwelling-houses; the Alkali Acts, a very important body of the law, dealing with various chemical works, which were capable of doing much mischief. The reports from year to year of Dr. Angus Smith were very interesting, as showing how the State might successfully deal with those evils. However, the Act with which they were most concerned, and which was applicable to London, was the Smoke Nuisances Act of 1853, which required that every furnace, in a factory, or other building used for the purpose of trade within the metropolis 'should consume or burn, as far as possible, all the smoke arising therefrom'. The benefits of this Act were modified by the wording 'as far as possible', and other qualifying words in the third section. No prosecution could be instituted by individuals. Information must be laid before the Secretary of State or the Commissioner of Police. There was also a similar provision in the Sanitary Act of 1866 and which applied to the metropolis. The Act of 1853 was administered by the police, and did not appear to have produced all the desired results. He had consulted their annual report, which showed there had been 301 cases of inspection and about 200 cases of fines imposed. It was stated that the police rarely acted without information being laid before them, and not always then. It was not understood on what principle the police acted in enforcing this law, and it was suggested by the Chairman that a communication be addressed to Sir E. Henderson, asking him to favour them with information as to the organisation by which the Smoke Nuisances Act of 1853 was put in force.

Mr. SAXON SNELL stated that the complaint had been made that the provisions of the present law were practically confined to compelling manufacturers to introduce appliances, at the same time making no provision for enforcing the actual use of them.

Miss OCTAVIA HILL read a letter from the Mayor of Nottingham, who attributed the successful working of their Act to a clause which levied a fine on the stoker.

Mr. B. L. MOSELY said it appeared to him, from what he had just heard, that the enforcement of the Smoke Act rested either with the Local Government Board, or, in case of the railways, with the Board of Trade, and in the metropolis with the Commissioners of Police. He was of opinion that section 5 of the Smoke Nuisances Act 1853, required some modification, but no recommendations had yet been made as to what should be done in the matter. Taking the common-law aspect of the case he thought it would be possible to proceed against those persons who infringed the law for a nuisance, by action or indictment; that would be where smoke was emitted in sufficiently large quantities as to be deleterious to health or injurious to property. He thought it might be practicable that that Society, or some members on behalf of it, living in the vicinity of smoky chimneys, should take action in the matter.

Mr. CHADWICK suggested it would be well if, being common law, it could be brought under the County Court jurisdiction.

Mr. B. L. MOSELY could not definitely express an opinion then, but would look into the matter and report on it.

Mr. J. L. WHITTLE said he was afraid the experience of common law had shown that it was cumbersome to work it.

The CHAIRMAN thought it would be of no use suggesting improvement in the jurisdiction without an improvement in the mode of inspection; and it was finally resolved that Mr. J. L. Whittle and Mr. B. L. Moseley should be prepared at the next meeting to make suggestions for the amendment of the law, preparatory to waiting upon Sir Wm. Harcourt.

Mr. MOBERLEY attended to tender further information in respect to the new French fuel, which had been highly spoken of in a letter sent to Miss POTTER; it proved to consist of hard, stony, but porous, fire lumps, pierced with holes, and impregnated with an inflammable substance. He was asked to procure a sample for the Committee, which he consented to do.

Mr. COLES undertook to furnish statistics of the evaporating power of different coals.

A third meeting of the Fog and Smoke Committee in connection with the National Health and Kyrle Societies, was held at 44, Berners Street, on November 4, Mr. Ernest Hart, Chairman of the Council of the National Health Society, in the Chair. The following, among others, were present:—Mr. Macfarlane, M.P., Prof. Chandler Roberts, Prof. Huntington, Mr. Coles, C.E., Mr. Mosely, Mr. Saxon Snell, C.E., Mr. Whittle, Mr. Flannery, C.E., Mr. Melville, Dr. Wyld, Miss Shaw Lefevre, Miss Potter, Miss Hill.

Letters were read by the Chairman from a number of gentlemen containing suggestions as to fuel and appliances, more or less practical, and which it was decided to refer to the Committee of Experts for their consideration. Among them were communications from Mr. C. Innes, C.E., Mr. E. Cooke (Westminster), Mr. C. H. Perkins (Swansea), The Rev. Henry J. Newcome (Shipley), Mr. F. W. Robinson (West Cowes), Mr. W. J. Melville (London), Mr. John Glassbrook (Swansea), Mr. A. Howatson (Paris), Mr. Owen Thomas, Mr. Hale White, etc., etc.

An interesting letter was read from Dr. Siemens, who stated, that he had lately constructed a simple gas fire-grate, which had proved highly successful, which he had not patented and was willing to place at the disposal of the Committee. It was decided to refer the matter to Prof. Chandler Roberts on behalf of the Committee of Experts, to communicate with Dr. Siemens, and make arrangements for testing its efficiency.

Mr. OWEN THOMAS, to test the adaptability of the anthracite coal for domestic purposes, offered not only to erect two grates, but to send up a couple of Welsh maids who would show the London maids how to use it.

Mr. COLES, C.E., reported, in accordance with a resolution of the previous meeting, that he was engaged in introducing anthracite coal at several public centres, with the object of showing the public the suitability of this coal for burning in ordinary grates. It could be seen by all interested in the trial at the Surrey Industrial Dwellings, Kennington, as also at the Charing Cross Hotel and at the Grand Hotel, Charing Cross. He was burning at these places the Trimsaran anthracite coal, but it was decided to test other kinds of coal, and to encourage colliery owners to forward samples for the purpose of trial, and to co-operate with the Committee in the testing of fuel.

Mr. J. L. WHITTLE read his further report of the

law, and stated that since the last meeting he had had the opportunity of conferring with one of the Assistant Commissioners of the Police, who explained to him the working of the Smoke Acts. The Commissioners were of opinion that they had succeeded in accomplishing a very great work, and appealed to those who knew London along the Thames and Lambeth in 1855 and 1860, when large masses of black smoke floated about the Metropolis, which were not to be found now. On the whole it appeared that important work had been done. In every division there was a constable told off to look after the smoke question. It was the business of every constable to report on a mass of smoke and to ascertain where it came from. Two notices were issued to the offender, and if the nuisance were not abated, an engineer was sent to examine the state of the furnace. The fourth step was to summon the proprietor of the furnace, and a fine was generally imposed. There was no testing of the smoke, as in the Alkali Acts. The Acts were directed simply to get rid of great masses of black smoke, without attempting to stop smoke altogether. How far other parts of London were inspected as well as Lambeth he was not able to say. It was calculated there were 597,289 private dwelling-houses in the Metropolis, which multiplied by 6 gave the estimated number of fire-places to which was attributed the quantity of smoke from which London now suffers. As an amendment in the law, he suggested that action should be taken in every case where the nuisance continued for ten minutes, and not, as was now the case, wait until the offence had become an habitual one. The Act as it now stood was not sufficiently rigid or decisive. He would propose that a Bill of this kind should be drafted and discussed section by section, with the aid they could get from manufacturers.

Mr. MACFARLANE, M.P., stated with respect to the Smoke Act as affecting London, that there was no radius, but that it was divided into parishes. What was required was an extension of the Act to a fixed radius from Charing Cross. He had prepared a new Act for presentation to Parliament during the last Session to procure an extended radius, but was prevented from introducing it owing to the large number of other pressing measures. He did not think such an Act would meet with any opposition.

Mr. J. L. WHITTLE would propose an Act for consolidating, improving, and extending the provisions of the present Acts. In lieu of the clause now imposing liability on stokers, he would suggest a similar clause as expressed in the Nottingham Act of 1874. As another important alteration in the present Act, he would suggest that it should be open to the public to institute prosecutions, and not be compelled to wait for the interference of the police. They might by an improved Act, and by stimulating public opinion, deal with the question, as far as manufactories were concerned, but the question of smoke arising from domestic houses was not a question for the legislature, but must rest with public opinion. They should endeavour individually to impress the principle upon their neighbours of their duty to make life more healthy and beautiful. When the Committee of Experts had settled on the best scheme they should individually endeavour to take advantage of the scientific advice afforded by the Committee of Experts, and he would suggest the formation of local committees to try and apply this principle.

The CHAIRMAN said it was quite clear they could see before them a prospect by which everyone might greatly diminish the amount of smoke in his own house, and get a bright fire by using anthracite coal, and lighting it with the addition of a little Wallsend or ordinary coal. Any ordinary stove would be suitable if provided with fire-clay sides, and by the adoption of a blower.

Miss LE FEVRE stated she had tried the anthracite coal with success, by using a little Wallsend when lighting the fire.

The CHAIRMAN was of opinion that they would have to rely upon public opinion to induce the adoption of a smokeless coal among the middle classes and lower middle classes, and with respect to the poor, other things would crop up to recommend themselves. For instance, it had been suggested that coal which had been partially coked, and a combination of anthracite dust with bituminous coal should be used.

Mr. B. L. MOSELY had been asked to furnish some information as to the power of County Courts to deal with actions arising from the smoke nuisance. He found that they had jurisdiction, and it was a great advantage, because the process was cheap and expeditious, and since the Judicature Act they had power to grant injunctions. The recommendations with regard to further legislation for the abatement of the smoke nuisance which he desired to put before the Committee were:—(1) That an Inspector should be appointed by the Local Government Board, and that all manufactories, etc., employing furnaces, should be registered; (2) That Section 5 of the Smoke Nuisance Act of 1853 should be amended, enabling any inhabitant to lay an information before a Magistrate, without, as now, being compelled to obtain the consent of the Secretary of State or Commissioners of Police; (3) a saving clause that 'nothing contained in the amendment Act shall be construed to render lawful any act or omission, which, but for this Act, would be deemed a nuisance at common law, nor to exempt any person guilty of a nuisance at common law from prosecution or action in respect thereto, nor from the consequences upon being convicted thereof; (4) that the *onus* of proving that the furnaces were properly constructed and in a satisfactory condition should be put upon the defendant instead of leaving the prosecution to prove the negative; (5) also that the Justices should be empowered to award half the penalty to the informer, the other half going to the Local Government Board, or if the Local Government Board were the informer, they should be entitled to the whole of the penalty recovered.

Professor CHANDLER ROBERTS announced that the Committee of Experts had not had time to do more than arrange the communications which had been laid before them for their consideration. They might be classified under two heads: (1) those proposing to employ anthracite coal, and (2) those recommending some peculiar form of smoke-consuming apparatus. It was suggested that there should be a Sub-Committee of Experts to deal with the question of patent fuels.

Miss OCTAVIA HILL reported that the Kyrle Society had voted £10 towards a fund for meeting the expenses incurred in the investigations of this Committee. It was also announced by the Chairman that the National Health Society had voted a similar sum.

The CHAIRMAN proposed that Mr. W. R. E. Coles, C.E., should act as Treasurer, which was unanimously approved.

Mr. FLANNERY, C.E., said he was not then prepared with a statement, but expressed an opinion that there

were many ways of preventing smoke, and he should be pleased to place his time at the disposal of the Committee.

It was moved by Professor Chandler Roberts, and seconded by Miss Potter, that Mr. Flannery, C.E, be requested to join the Sub-Committee of experts.

A fourth meeting of the Fog and Smoke Committee of the National Health and Kyrle Societies was held on Wednesday, November 10th, at 44, Berners Street. Among the members and other ladies and gentlemen present were—Professor Chandler Roberts, C.E., Dr. Tripe, Mr. W. Eassie, C.E., Mr. W. R. E. Coles, C.E., Mr. J. L. Whittle, Mr. B. L. Mosely, Mr. Ernest Turner, Mr. Saxon Snell, Dr. Wyld, Mr. Owen Thomas, Mr. Foley, Lady Harberton, Miss Octavia Hill, and other ladies.

The chair was taken by Mr. ERNEST HART (Chairman of the Council of the National Health Society), who briefly reviewed a mass of fresh correspondence, received from various quarters, testifying to the large amount of interest this question has aroused, and was referred to the Committee of Experts. He then proceeded to lay before the meeting some account of the Committee's operations in respect to the testing of smokeless coal. The Committee had now at their disposal a great variety of smokeless coal, received from various collieries, which was being tried at a number of public places; amongst others, at the Charing Cross Hotel, the Grand Hotel, the Surrey Lodge Industrial Dwellings, Kennington, at the waiting-rooms of the London Bridge and Victoria Stations of the Brighton Railway, at the Paddington Hotel, and in several private houses by members of the Committee. At each of these public buildings smokeless coal might be seen burning by those interested in the movement. Persons scientifically interested in the trials might obtain supplies of smokeless coals by applying to the Committee. From the reports received, these trials had proved, on the whole, extremely satisfactory; but communication had also been received from persons who had tried the anthracite smokeless coal with less success, and it was quite clear that a great deal of disappointment, probably some amount of unreasonable and mischievous disappointment, might occur unless the anthracite coal were tried under conditions to which it might fairly respond. The Committee had accordingly thought it desirable to draw up some simple directions for burning it. With the assistance of Mr. W. R. E. Coles, their treasurer, they had provided a paper, which indicated the way in which these coals might be burnt by anyone with a fair chance of success, without any elaborate operation, by obtaining good anthracite coal, and by seeing that the directions, of which the following is a copy, were strictly carried out.

DIRECTIONS FOR BURNING SMOKELESS COALS.

1. A good draught is required in the chimney where the draft is deficient, or, when the fire requires stimulating, a 'blower' should be used.
2. The smokeless coal should be put on the fire lightly in pieces about egg-size. Fires should be replenished with moderate quantities, and before they get too low.
3. The coal should never be stirred with the poker. The ashes from the bottom of the fire should be gently raked out; the smokeless coals require as much air as possible.
4. For kitchen use, no saucepan or kettle should be put to rest on the fire, they should be rested just *above* the fire, as the smokeless coals will *not* bear weight.
5. Grates or stoves with fire-clay sides and back are best adapted for burning smokeless coals, but they will burn in ordinary iron grates with attention to the above rules.
6. The cinders of the smokeless coal can be used, and make a bright fire if they are sifted quite free from ash. The cinders are particularly useful in lighting fires.
7. To light a fire readily with the smokeless coals *alone*, a good quantity of wood is required; a little of the ordinary description of coal to start the fire is useful. A red hot iron or 'salamander' taken from one fire, and inserted under the wood of another, kindles it very readily, a strong heat being required to light smokeless coals.
8. The above directions apply to burning the smokeless coals in closed stoves as well as in open grates.

The CHAIRMAN had recently been burning anthracite smokeless coal in his house, and was satisfied with the results; indeed, the kitchen fire had burnt better than it had ever done with other kinds of coal, and with half the quantity.

Mr. FOLEY, who said he had used anthracite coal for twenty years, recommended putting on the coal in large quantities or making it up afresh, as preferable to feeding the fire frequently with moderate quantities.

Mr. W. R. E. COLES represented that the result of the trials made by the Committee did not prove that it was necessary to remake the fire when it required replenishing, and suggested that what was regarded as a necessity with the large fires kept in the coal districts, would not equally apply to general requirements.

It having been thought that the recommendation of the adoption of a blower would be an obstacle in the way of its general adoption, Mr. Coles stated that at the Charing Cross and Grand Hotels, no blowers were used.

Dr. WYLD thought in those cases the want was overcome by the continual heat of the grates, where the fire was burning day and night.

The CHAIRMAN stated that all the recommendations received from anthracite colliery proprietors agreed with the printed directions then submitted. He had to report that further steps had been taken towards the meeting with factory owners, and persons producing large quantities of smoke, which meeting would be held at the Cannon Street Hotel, on November 25th. Some of the factory owners had met the matter in a very satisfactory spirit, and were desirous of working with and aiding the Committee, and they had reason to hope that good results would follow from this meeting. It would be open to all members of the Committee. They had to consider the question of making fresh trials, and the way in which they should be made; the Committee of Experts would, in the meantime, proceed with their task.

To meet the incidental expenses attending this work, a smoke abatement fund had been opened at Messrs. Barclay's, and the National Provincial Bank (Baker Street branch), Mr. Coles acting in the position of treasurer. A City circular, descriptive of the objects of this Committee, was put before the meeting and approved. The Chairman stated that there had been one legislative suggestion which deserved consideration; it was thought desirable so to amend the builder's law as to make it imperative that all new houses and houses being rebuilt, should be furnished with smoke-consuming appliances. He thought it would be within the province of the meeting to address the vestries on the importance of having the smoke laws as they now exist, more effectually put into operation in their districts.

Dr. TRIPE agreed with the suggestion that all furnaces and fireplaces not belonging to private houses should be constructed so as to consume their smoke, and stated that the Sanitary Act of 1866 gave the power to enforce this to the Metropolitan Vestries and District Boards, and that the local sanitary authorities outside the metropolis possess the same power under the provisions of the Public Health Act.

It was decided that the Chairman, on behalf of the Committee, should address the Vestries, requesting them to put the Act in operation.

Dr. TRIPE stated that in Hackney this power was exercised, and the previous week six notices were served on offenders.

Miss OCTAVIA HILL thought the proposed Bill should at present be confined to the manufacturing interest.

LADY HARBERTON called attention to the large amount of smoke emitted from the London club houses.

Mr. J. L. WHITTLE stated that they were amenable to the Act of 1866. It was one of the many instances where a more active public opinion might give greater life to the existing Acts.

Dr. TRIPE, who had been asked to speak on the fog question, said fogs had two origins—terrestrial and atmospheric—the fogs having the greatest extent were the atmospheric. He alluded to the fogs experienced by aeronauts in balloon voyages. He had seen such a fog in Hackney, bringing a darkness as of night, passing about 300 feet above the earth. The fogs or mists prevalent in London arose either from the valley of the Lea or the Thames, or came from the air. They were caused by air loaded with moisture coming in contact with the earth at a lower temperature, when the moisture, which had lain latent, became visible, and becoming mixed with soot and the irritating tarry vapours of combustion, it rolled down to the lowest point. The fogs coming from below did not sometimes extend higher than 15 to 100 feet. The prevention of mist, therefore, could not be hoped for. The question was, did the anthracite coal so completely burn up the products of combustion as not to give off these empyreumatic vapours. He was of opinion that by the adoption of a blower it did.

Professor ROBERTS stated that the amount of carbon in anthracite coal was 98 per cent., and the amount of volatile matters extremely small.

Dr. TRIPE stated that, at three or four o'clock in the morning, the atmosphere of London was as clear as it was possible to be. He though the paving of the metropolis was likely to increase the fogs, because it radiates much more quickly than earth. There were, too, the fogs which were caused by evaporation from the surface of water and grass-land, but these are not so common as the radiation fogs. He did not think it possible to diminish the frequency of fogs. London is more liable to fogs, but it suffers more from them—it is in a valley, but does not suffer more than other valleys having a large river running through them; but the fogs are more dense and irritating, in consequence of the large amount of the products of coal combustion which they contain. The clay of London was to some extent favourable to it.

Professor CHANDLER ROBERTS, on behalf of the Committee of Experts, stated that they had as yet no communications to make. They were engaged in considering the further recommendations, which were of the same character as before. They met on Monday last at the Mint. It was stated that Mr. Owen Thomas and Mr. Foley had brought up two grates, in which anthracite coal might be burnt, for the use of the Committee.

Sources of supply of smokeless coal may be ascertained on application to the Secretary of the National Health Society, 44, Berners Street, S.W.

THE INTERNATIONAL FOOD EXHIBITION.

As a whole this Exhibition, held in the Agricultural Hall from the 13th to the 20th of October last, was of a complete and comprehensive character. The leading feature in what was shown was American and Australian tinned produce—the American exceeding the Australian in the proportion of five or six to one. English tinned produce was shown to a comparatively small extent, but the exhibits of this class were of almost superlative excellence.

Nearly every kitchen requisite or even nick-nack found its place on one or other of the stands; even such things as saucepans, kettles, sieves, and grid-irons were considered to come within the category of food, and many an English matron, in walking round the Exhibition, must have been surprised to see how much her ordinary culinary utensils were inferior to the best that could he furnished, not only by one, but by most of the leading makers. The promoters of the Exhibition even went so far as to allow of the exhibition of machines for the wholesale manufacture of food; such, for instance, as Hancock's machine for kneading bread and biscuits, two of which were shown, doing their work in the most satisfactory way; and sausage mincing machines. One of these, J. Williams', minced the meat for 360 sausages in less than four minutes, and the minced mass being quickly transferred to another machine, the sausages were completed in about six minutes more.

Fresh English foods were comparatively but little represented. There was, it is true, a butcher's stall in the Hall, and butter, cheese, and bacon were on show. The exhibitors of this class of goods, however, seemed to consider that the air of the Hall, vitiated as it must have been by the thousands of people present, and by the gas, no less probably than by the impurities remaining in a building used from time to time for so many varied purposes, spoilt their goods, so that it was of but little use for them to compete with others whose wares were hermetically sealed and protected from this contamination.

There was one new whisky, the Short Horn, exhibited by Messrs. Lediard & Co., which was said to be produced from four different grains malted together. This was certainly unique, and the flavour was quite satisfactory enough to bear out the statement.

Of aërated waters not medicated, the most prominent in the exhibition were the Harzer, shown by the Harzer Mineral Water Company, 135, London Wall, and the Gerolstein, shown by the Gerolstein Water Agency, Philpot Lane, E.C.; both of them however possess medicinal properties, and while we can recommend them as pleasant beverages, and excellent of their class, it seems that in each case some discrimination will be needed in their use. A silver medal was awarded to the Gerolstein water. Two new medicated waters of the phosphate of iron class were shown—Vin Santé, shown by Evans, Sons, & Co., of Liverpool, and Sparkling Phosphade, by Idris & Co., of Haverstock Hill; Zoldat was a good medicinal beverage, and seemed likely to come into

extensive use, Messrs. Begg & Co,, of Manchester Road, Bolton, showed this drink. Each of them is pleasant as a beverage, and the analyses made by the judges, Dr. Tripe, Mr. Wigner, Dr. Hardwicke, and Dr. Bartlett, seemed to shew that they are really useful drinks from a medical point of view. It is important to note that the judges say that in every case they have considered price, as well as quality, both as to drinks and foods.

The best articles in tinned goods were unquestionably the fruits; the exhibits comprised pineapples, apricots, pears, plums, peaches, greengages, and apples; five or six brands of some of them being shown. Without a single exception, everyone that we tasted was of the highest excellence; some of the pineapples, especially those preserved whole, were quite equal in flavour to the finest English pines we have met with.

The tinned vegetables were as a rule very good. A few samples, such for instance as some of the brands of green peas, and one or two of the brands of haricot beans, were perfectly unexceptionable. There was no brand of fruits which excelled that of Messrs. N. K. and F. B. Thurber & Co., of Cannon Street; but the Golden Gate Packing Company, represented by Messrs. A. W. Latham & Co., showed some superb pineapples and apricots. In other instances, as Okra and Succotash, the preparations were rather too American in their style to suit an average English palate.

Prepared corn-flour and cereals of various kinds were shown in large numbers, but a good many of them were of very indifferent quality, either containing an undue proportion of the hard outer husk of the grain or nominally, while not really cooked, or a certain portion of the gluten had been abstracted, so that they were but little better than starches. Probably the best on the whole was Kingsford's Oswego Corn Flour, which gained a medal from the judges, and this preparation seemed to be closely run by Thomas Carwardine, who also had a medal for a fine exhibit of flour. The A B C cereals were shown, and gave proof of careful preparation. These latter are certainly cooked as they are stated to be.

Apparently the best among the cocoas exhibited, were Schweitzer's 'Cocoatina' which obtained a silver medal, and Tulloch's Dutch Cocoa, both of which were free from admixture, but in each case a portion of the cocoa butter had been removed; in flavour these were both unexceptionable, and the latter rather unique in quality. The so-called soluble cocoas containing any percentage of starch from 10 up to 80 per cent., were shown as usual, but for those persons who prefer to drink a delicate beverage instead of a thickened one these do not possess any special attraction. We noticed also on Dunn & Hewett's stands their special exhibit of pure cocoa, which was good, and we were pleased to see that they also obtained an award of a medal from the judges.

Messrs. Stein also showed a new preparation of cocoa, Liebig's Leguminose Cocoa, in which, instead of the admixture of flour or starch ordinarily made in the soluble cocoa, a pulverised lentil has been used, thus maintaining the albuminoid compounds in their full proportion. The preparation seemed to be greatly appreciated by the numerous persons who tasted it.

Messrs. Bensdorp and Co. exhibited their pure soluble cocoa, which belongs to that class of cocoas from which the fat has been extracted, and to which no starch has been added. It is fine in flavour, well ground and prepared, and takes rank among the higher class of soluble cocoas. Its special merits are purity, good flavour, and excellence of manufacture.

Messrs. Phillips & Co., of King William Street, displayed a rather unique collection of teas of all classes, to which a silver was awarded. The greater part of these would probably not meet with general approval for ordinary use, because a blended tea is almost always preferred to a pure one. Some of them, however, were so unique and cheap as to attract special attention.

Coffee was mainly represented by the different makers of coffee extracts. Mr. T. Smith, who claims to be the original maker of coffee extract, and Messrs. Branson, whose bottles are so well known, not only exhibited their samples, but gave away some hundreds (it might be thousands) of cups daily for visitors to taste. To the latter maker a silver medal was awarded.

Some of the exhibits of cheese were excellent, and particularly worthy of mention were the shows of Emmenthal cheese of the Swiss Milk and Food Company, who obtained a silver medal, and of the Camembert cheese of Constant Biellard.

Of condensed milk a sample was shown by Messrs. Miller & Halls, of Hibernia Chambers, which is comparatively little known, viz., Hooker's unsweetened (so-called) cream milk. While the quality of this is unquestionably good, it is doubtful if it will ever come into such ordinary use as the commoner brands, because, prepared as it is, the makers will not guarantee it to keep longer than from six to eight days. Still, even in this case, it may be advantageously used in some instances, instead of the other sweetened milks.

The Swiss Milk and Food Company showed samples of their excellent Condensed Swiss Milk (Aventicum Milkman Brand), which is noted among all the Swiss brands as containing the greatest quantity of cream, the place where it is manufactured being situated in a district of Switzerland famous for its rich pastures, particular care being taken that all the cream should be left in the milk. It contains no other addition than pure cane sugar. The same company show Oettli's Milk Food for Infants and Invalids, a food which was originally prepared by a chemist to feed his own child, and gave such satisfactory results that it soon found its way into general use in Switzerland. It is prepared with roasted wheaten flour and the above-named Condensed Swiss Milk. The milk preserves all its original qualities and nutritive elements, and the flour is prepared in such a way as to transform into gluten the indigestible starch. The agency of the company is at 46 and 47, Redcross Street, E.C., where a variety of their useful food products can be tested.

Though scarcely perhaps a food product, Moller's pure cod-liver oil is of so much value in the dietetic treatment of lung disease that it may fairly claim representation in an exhibition of dietetic products. This cod-liver oil has been repeatedly subjected to test by the most critical judges, and has received the highest awards at the international exhibitions of the last decade, taking the only medal at the International Exhibition of London, 1862; the only first prize at the International Exhibition, Paris, 1867; the first prize at the Philadelphia Centennial Exhibition, 1876; the only gold medal at the Paris Universal Exhibition of 1878; and the gold medal this year at the International Exhibition of Berlin. These distinctions, together with the testimony which this preparation has received from medical men as

to its clinical value, is more than sufficient proof of its merits. It is, as any one can determine by personal experiment, a very carefully refined oil of perfect clearness and purity.

Mr. P. A. Maignen, of Great Tower Street, exhibited his Filtre Rapide. We have already on one or two occasions briefly set forth the merits of this filter, but a short description of it would not be out of place. The filter appears in a variety of forms, but the principle is the same throughout. The apparatus consists of an outer case or shell containing one or more hollow and rigid filtering frames covered with a woolly material of special manufacture forming strainers properly stretched and laced on the frames. On the outside of these strainers, is a thin layer of pulverized charcoal or other finely ground filtering medium, and which is deposited by the current of the first water as it passes horizontally through, then to the outlet tubes. As will be seen from the following description, this simple principle possesses many striking advantages, more especially (1) rapidity of action, owing to the large filtering surface; (2) perfect classification by the firmness of the medium employed; (3) facility of cleansing: every part is accessible, and the method of 'setting' with the medium used is intelligible to all; (4) aëration and purification. The interior of the frames is kept charged with air by air-pipes from the top, and each of the minute drops of water percolating through the strainers, takes up the oxygen of the air, imparting a fresh and wholesome taste to the filtered water. Again, the medium being only used in small quantity, can be frequently changed, thus ensuring its efficiency in continuing to purify all the water passed through it. We were first shewn a set of filtering frames made for one of the London Water Companies, and were told that with 40 filters, each containing 50 of these frames, and contained in two rooms 90 feet by 30 feet, a supply of 24,000,000 gallons daily could be efficiently filtered. Thus the filtration of water through charcoal can at length be accomplished by water companies, and that at an expenditure scarcely exceeding, if at all, that of the present imperfect filtration through sand and shingle. The charcoal, after use, will have also some value as a manure. Mr. Maignen considers the aëration of the water which will be effected by these frames is alone a great step in advance of the present sand system. Passing to secondary applications of this useful filter, we noticed two 'No 1 C service' filters in action, each giving a brisk and fresh-tasting water at the rate of 50 gallons per hour. This form of filter contains only one filtering frame, and the supply is taken direct from the main or cistern by a ball-cock. Models were shown of smaller filters made of earthenware for household purposes based on the principles already described, and so rapid is the filtration even of one of these small filters that *no* storage of the filtered water is required. This is a very marked step in the right direction. These filters are so easy to clean that there is now no excuse for the householder who neglects to attend to his filter. But perhaps the most interesting model was that of a portable filter for the officer's kit. This consists of a cylindrical case about the size of a soda-water glass, containing a filtering frame, a box of pulverised charcoal, and a drinking tumbler; so that a soldier in the field, or a tourist on his journey, to make sure of the water he drinks, can take his supply from the brook or river, and, mixing with it a teaspoonful of the charcoal, can pass it through the filter and drink it pure. Mr. Maignan is now also at work at a 'poor man's filter' for the million, which much resembles this officer's filter. We may mention that the Filtre Rapide is already largely used by wine merchants, distillers, cordial makers, mineral water manufacturers, chemists, druggists, and in other industries, and indeed it would seem from its miscellaneous applications that the Filtre Rapide will soon supplant funnels and bags everywhere.

Of tinned beef, tongues, hams, chicken, brawn, etc., the name was legion; and best of all the beefs was perhaps that of the St. Louis Compressed Beef, shown by Messrs. Miller & Hall, which obtained a silver medal; Messrs. Libby, McNeill, & Libby's samples of tongue on show and taste were simply unsurpassable; and best of all the English tinned tongues was an article shown by Messrs. Poulton & Noel; while of the tinned chicken and turkey nothing compared in flavour to Booth's oval brand, tinned in America, with an entire fowl in each tin, the tin being filled up with a thick stock, giving the whole product the character of a galantine of fowl. These were shown by Messrs. Rogers, Gunn, & Co., of Leadenhall House.

Hams also were shown, tinned entire, but with the bone drawn; some of these were excellent.

This same tinning company (Booth's) also showed gooseberries, cherries, strawberries, and raspberries. The two former were good, but as to the two latter, the flavour had certainly to some extent deteriorated. Still, on tasting and testing even these, it did not appear that the metal of the tin had at all come into solution.

There were very few exhibits more important than cooking stoves; although not numerous, several of them showed features of very high novelty and excellence. This was especially the case with the gas cooking stoves of Greene and Co., of Cannon Street, who obtained a silver medal. In these stoves the consumption of gas has been brought down to a cost of less than a penny per hour for a stove capable of cooking for a family of six or eight persons. One of these stoves was at work at the stall, cooking at the same time a small joint of meat, two pies, and boiling four saucepans, and the consumption, which was verified on the test meter standing on the side of it, amounted to less than the price we have mentioned above. A notable feature in connection with it was that no smell of the products of combustion of the gas could be perceived. But when coal must be used there can be now no difficulty in obtaining a suitable range. Two kitcheners were exhibited, one by the Eagle Range Company, of Birmingham, and the other by the Wilson Engineering Company, Goswell Road, to which silver medals were awarded, both of which are amply capable of meeting the requirements of any family, not only as regards successful cooking, but also economy in fuel and a minimum of attention. The range shown by the former firm was so arranged that the fire might be reduced in size to almost any extent that might be desired when the cooking was finished, and both were fitted with special arrangements for converting the closed fire of the ordinary kitchen into an open grate, by the mere movement of two or three doors, in order to warm the kitchen, or to air linen, when the cooking is over.

The catalogue, which was issued for sale in the Hall, was the most unique we have ever seen, inasmuch that it contained on every page space for visitors' notes to be made against any exhibit which they wished to think about afterwards. Memoranda of this kind made on the spot are of infinitely greater value than

the necessarily confused remembrance carried away by those who, after carefully looking at some exhibit, walk on without making any note about it.

The awards of the judges are as follows :—

GOLD MEDALS.—Thurber & Co., for their own packed goods; A. W. Latham & Co., for exhibits of Natal Packing Co., Richardson & Robins, and St. José Fruit Packing Co.

SILVER MEDALS.—Dickson & Renwick, for Booth's oval brand of preserved meats and soups, and Pacific Fruit Co.'s brand of preserved fruits; Wilson Chicago Packing Co., for tinned goods; Miller & Hall, St. Louis compressed beef; Aylesbury Dairy Co., dairy produce; Allen & Hanbury, pharmaceutical preparations; A. May, fruit; Schweitzer & Co., cocoatina; Tallerman, meat preserved without freezing; Greene & Son, cooking stoves; Phillips & Co., tea; Hill & Son, whole meal bread; P. A. Maignen, filtre rapide; Lediard, imported whiskies.

BRONZE MEDALS.—Dunn & Hewitt, cocoa powder; Davis & Co., gas cooking stoves; T. Williams, silent sausage machine; Evans, Sons, & Co., lime juice preparations and Vin Santé; François Fils, Narbonne wine; P. Pfleiderer, dough mixing machine; Wilson Engineering Co., cooking ranges; Eagle Range Co., cooking ranges; Savory & Moore, pharmaceutical preparations; McCall & Co., tinned meats; Hancocks, dough kneading machines; Oswego Co., prepared corn; T. Carwardine, flour; Scalley & Co., whisky; G. Kent, cooking, preserving, and food preparing machines; Fry and Co., cocoa extract; H. W. Brand, soups and sauces; Thomas & Oxley, tinned fish; Robb & Co., general exhibit; J. Duncan, crystallised sugar; Dowling & Son, meat dressed for table; Yeatman & Co., Calisayine bitters; Ward & Co., tinned asparagus and apricots; Shingleton & Co., artificial ice; Poulton & Noel, English tinned tongues, etc.; H. Husberg, Swedish butter; Swiss Milk & Food Co., cheese; Low, Huckvale, & Co., Libby's compressed beef and preserved tongues; Manger & Son, table and other salt; Weston & Westall, table and other salt; Rogers, Gunn, & Co., tinned poultry and fruits.

HONOURABLE MENTION.—Brett & Co., sherry and dry bitters; Begg & Co., zoldat; W. Hay, general exhibition; Noel, fois gras and foreign preserves; Chapman & Son, apparatus for making beef tea; Barry's Condensed Food Co., condensed eggs; Anglo-Russian Iron and Tin plate Co., for iron and tin plates enamelled with non-poisonous pigments; J. Schwartz, crystallised sugar; J. K. Bellis, dried Jamaica turtle; Kopf's Extract Co., general exhibit; Goddard & Tamsett, bacon and lard; E. Wood, semolina and vermicelli; Army & Navy Provision Market, fresh fish; R. Barth, Swiss cheese; Hillier's Bacon Curing Co., bacon and sausages; Goodall, Backhouse, & Co., sauces; D. Wilkie, wheat-meal bread; Albion Lamp Co., cheap petroleum cooking stoves; Branson & Co., extract of coffee; Chollet & Co., compressed vegetables and soups; West Brothers, cheap gas cooking stoves; J. F. Clarke, range with balance gridiron; Davis & Littlewood, Glencoe Highland whisky; Möller, cod-liver oil; Idris & Co., sparkling phosphade; Gerolstein Water Agency, Gerolstein; W. & T. Ovens, silent sausage mincing machine.

The period of office of Mr. W. M. Hancox, Medical Officer of Health for Bilston, expired on the 29th of September. He did not offer himself for re-election in consequence of the reduction of the salary, and the office at present remains vacant.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

THE first meeting of this session was held on Friday, Oct. 15th, Dr. Bristowe, President, in the chair. After the minutes had been read, the council brought up a report on the approaching census, in which they stated that this society, as well as many others, were of opinion that the summaries should be published at as early a period as possible, and that therefore it is satisfactory to know that Government have made the necessary arrangements for the publication of the summaries within about three months, instead of at the end of a year, as was customary heretofore. As regards the vital statistics given in the reports of Medical Officers of Health, the Council are of opinion that they should be calculated for the period embraced by the registration year. The Council also reported that they had postponed the consideration of the question of collecting waters for analysis until next meeting. All these were agreed to by the meeting. Dr. W. H. Collingridge, Medical Officer of Health for the Port of London was then elected a member; Mr. Augustus Marion, Medical Officer of Health for Luton Rural Sanitary District, was elected an extra-Metropolitan member, and Sir Brydges P. Henniker, Bart., was elected an Honorary Member. Dr. Ogle was nominated as an Honorary Member; Mr. Cosmo Innes, M.I.C.E., Dr. J. Symons, and Mr. Kemp, were also nominated as Associates. A letter was read from Dr. Billings of the Surgeon-General's Department, New York, stating that several publications of sanitary subjects had been forwarded to the Society, and requesting that all future publications on these subjects by Officers of Health willing to contribute to the library at New York, should be forwarded to Dr. Billings. Dr. Tripe then moved a vote of thanks to Dr. Billings, and also that the question of the Society's library be referred to the Council. On Dr. Dudfield's motion, the advisability of organising a system of the collection of refuse from animals, and especially fish, was referred to the Council.

The President then read his Inaugural Address, which he commenced by stating that as his last discourse was incomplete, he had written this as a continuation. He then said, that probably an intelligent layman, on being informed that the death-rate of a given district was unusually high, would take it for granted that the excess of mortality was caused by a want of proper sanitary supervision. But if he were told that the mortality arose chiefly from inflammatory and tubercular diseases of the lungs, heart disease, etc., over which Medical Officers have no control, he might point to a large mortality from zymotic diseases and say, here at any rate is an indication of sanitary neglect. Even in this he might be wrong, as the powers of Medical Officers of Health are too limited to stamp out these diseases. As regards the prevention of small-pox, the most efficient agent, that of vaccination of infants, and re-vaccination of adults, is not supervised by the Health Officer, but by the Boards of Guardians. But even if these officers do their duty, the weak-kneed politicians of the present day have lately proposed to grant licences to contract and propagate this disease to those who will pay a nominal sum as a penalty for neglect of vaccination. The evidence in favour of early vaccination and re-vaccination as a preventive of small-pox is overwhelming, as shown by the rarity with which nurses and others who have been re-vaccinated, and then, exposed to the infection, contract the dis-

ease. There is therefore no doubt that if these measures had been actively carried out, the disappointing epidemics we have lately witnessed never would have occurred. As regards typhoid fever, sanitary science has shown that the poison is chiefly cohtained iu the alvine discharges from patients, and that it is spread by the drinking water becoming contaminated. The improvements in the drainage and water-supply of London have done much to diminish the mortality from this disease. Cholera, when once introduced into London in former times, became widely spread over the whole metropolis, but of late the cases and mortality have been strictly localised by careful sanitary supervision. On the other hand, we have not yet acquired the knowledge necessary to prevent the spread of diphtheria. We are also ignorant of the precise cause of typhus and relapsing fever, and only know that overcrowding and starvation favour their occurrence. The utility of the disinfection of infected clothing and bedding is now well known, but the law is not sufficiently stringent to prevent the exposure within doors of infected persons amongst those who are healthy; but even if more power were given, the want of early information of outbreaks acts as a great check to preventive measures being efficiently carried out. The limited powers possessed by Medical Officers of enforcing the removal to hospitals of the sick, is another cause of spreading disease. It is true that Poor-law Officials have done good service, by the removal of infected cases to hospitals, but their action should be supplemented to a greater extent than is possible at present by the sanitary staff of Vestries and Boards. Our relations to diseases of other kinds are less immediate than to infectious diseases, except by the indirect action of the Metropolis Local Management Acts and the Nuisances Removal Acts. We can require good drainage, including proper trapping of drains; the providing of a proper water-supply and apparatus for flushing drains; the provision of dust-bins and removal of their contents, and supervision of houses as regards cleanliness, good repair and proper ventilation; but we have no authority in the metropolis over their erection, either as regards materials or foundations. These matters belong to the District Surveyors. But even if we had more power, how could we prevent inflammatory diseases, consumption, and other hereditary affections, and the diseases brought on by intemperance and other vicious habits? There is another matter in which I differ from many, viz., in the interpretation I put on the mortality returns. I consider that although the registrars' returns furnish us with most useful information, yet they are but a tangled problem which requires very careful consideration; for much has to be done before the death-rate of a Metropolitan District or Parish can be accepted as correct. Some have hospitals, lunatic asylums, and extraneous workhouses, whilst others have neither, not even their own workhouses, and there are other sources of error beyond these. My last subject is the relation of Officers of Health to those who appoint them. Many consider that Medical Officers of Health should be irremovable, except by the sanction of a central authority. I can scarcely agree to this opinion, except perhaps as regards combined districts. It is doubtless an unfortunate thing, for the officers, and the people amongst whom they work, that the tenure of office is uncertain, but what good can an officer effect if he have not the support of the body appointing him? Besides, he might be virtually dismissed by a reduction of his salary to a sum which would be utterly inadequate to the work to be performed. Our duties to the public may be briefly summed up, by saying that we must carry them out regularly, systematically, and thoroughly, and must endeavour by moral influence to effect much which the law does not empower us to perform. As regards our medical brethren, we must do everything in our power to disarm oppositon, and to induce cordial co-operation on their part. We must never do anything to injure their position with the public, or to interfere with their relations with their patients, but should endeavour to make them see that it is for the general benefit, as well as in their own interests, that early information of the existence of infectious disease should be supplied to us. In conclusion, I would again point out that the position of a Medical Officer of Health in his district depends mainly on himself; on the moral influence which he attains amongst those with whom and for whom he works. I need not look beyond my audience for conspicuous examples of the truth of my assertions.

Dr. Tripe proposed a vote of thanks to the President for his useful address, which he considered would assist in placing Medical Officers of Health in their proper position before the public. Dr. Buchanan seconded it, expressing his great satisfaction with what he had heard. Carried by acclamation. The meeting then adjourned.

The attention of the authorities of Gateshead has been called to the damage done to the flowers and shrubs in the cemetery and other places, by the noxious vapours arising from the chemical works in the neighbourhood. The Town Clerk is collecting evidence in the matter, with a view to a remedy.

The Council of Public Hygiene of Paris, on the proposition of M. Pasteur, has decided to erect two establishments, one at each end of Paris, intended for the disinfection by steam of all furniture or clothing contaminated by persons attacked by any contagious diseases.

At a recent examination held by the Sanitary Institute of Great Britain, seven candidates were present, and certificates were awarded to H. P. Boulnois, M.I.C.E., W. K. Burton, A. Harland, C. Innes, M.I.C.E., who passed the examination for Local Surveyors, and a second certificate was awarded to A. Harland, who also passed the examination for Inspector of Nuisances.

The October 15th issue of the *Sanitary Engineer* of New York comprises twelve additional pages, and contains an unusually large and varied amount of reading matter, including the first accurate description of the mode of ventilating the New Madison Square Theatre, illustrated; a map of the drainage system of Memphis, with a description; a very sharp analysis, by an expert, of the claims of the 'Prall' system of warming, and a no less vigorous overhauling of the widely heralded 'water as a fuel'. Plans are given of a country house, showing the proper methods for warming the same, in connection with Dr. J. S. Billings' series of 'Letters to a Young Architect on Heating and Ventilation'. English sanitary affairs are discussed by Professor Henry Robinson, and Mr. G. W. Wigner describes the working of the English Food Adulteration Acts. Mr. E. G. Love states some interesting facts about arsenical wall-papers. A full page of engineering notes is given, and an equal amount of queries relating to a great variety of practical subjects. There is also an interesting illustrated account of French and English bathing appliances.

THE YORKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

THE Annual Meeting of this Association was held on the 19th October, Mr. S. W. North, President (York), in the chair. The members of the Association present were Drs. Hime (Sheffield), Mitchell Wilson (Doncaster), S. Drew (Chapeltown), J. F. Holden (Hull), Fred W. Barry (Settle), — Arbuckle (Thorne), H. J. Hardwicke (Sheffield), and Titus Deville (Harrogate); Messrs. G. Goldie (Leeds), E. B. Hicks (Easingwold), Wm. Marsden (Mirfield), G. Browning (Oughtibridge), W. D. James (Sheffield), and W. Sykes (Mexborough). The visitors present were Drs. J. Law (Sheffield), Lewis Hunt (Sheffield), F. Renk (Munich), A. Davy (Sheffield), Messrs. H. S. Bell (Sheffield), M. E. Burke (Sheffield), Thos. P. Norwood (Sheffield), — Atkinson (Sheffield), J. Benson (Broomhill, Sheffield), A. H. Allen (public analyst for Sheffield), and Theodore Dodd (Sheffield).

The CHAIRMAN presented the report, which was as follows:—'But two meetings of the Association were held during the past year, one on January 29, at Rotherham, the other on May 7, at Leeds, the latter being a combined meeting of the Northern Counties, North-Western, and Yorkshire Associations. (The proceedings at these meetings are reported in the SANITARY RECORD for February 15 and June 15, 1880.) Last year the Association had to regret the loss of their excellent secretary, Dr. Parsons, in consequence of his appointment to the office of a medical inspector under the Local Government Board; this year they have to regret the loss of his successor, Dr. Barry, who has accepted the appointment of chief sanitary officer in Cyprus. The committee recommend the appointment of Dr. T. Mitchell Wilson, of Doncaster, to the office of honorary secretary; the committee would recommend that arrangements be made for holding during this year one or more conjoint meetings with the members of other associations. The society now numbers sixty-seven members, and the committee earnestly desire that if possible the Association should include the entire body of Medical Officers of Health throughout the county, feeling convinced that frequent meetings for conference and discussion serve in an eminent degree to promote the progress of sanitary science and to strengthen the hands of those whose duty it is by every available means to promote the health and well-being of the community. The almost invariable presence at our meetings of members of corporations and other local sanitary authorities cannot fail to increase that spirit of mutual trust and confidence without which it is impossible to attain that measure of success which is the end and aim of all whose duty it is to administer the public health law of the country. The following gentlemen were the Committee for the past year:—President, S. W. North; Vice-Presidents, T. Scott, M.D., Dr. Wade; Committee, H. Butterfield, J. S. Cameron, M.D., S. Drew, M.D., J. Farquhar, M.D., J. Hardwick, M.D., H. F. Holden, M.D., G. E. Rawson; Secretary and Treasurer, F. W. Barry, M.D. After the payment of expenses there is a small balance to the credit of the Association.'

The CHAIRMAN then reviewed the principal features of the report, and went on to remark that it afforded the Association considerable pleasure to have the opportunity of meeting again in the great industrial centre of Sheffield. It was always a great pleasure, especially to those members coming from smaller places, to meet in large centres, and they never came without feeling that there was something to learn in large moving populations, and that there was much to be acquired. The past year had been an uneventful one in matters of sanitary science. He was not aware of any great changes or suggestions for legislation or otherwise, but there were questions slowly coming to the front that it would behove the Association and all corporations to see how, with great care, they would work for the benefit of large communities. The County Government Boards would exercise great influence over sanitary matters, and would also possess considerable influence with respect to the re-organisation of sanitary officials throughout counties, and it might be that when the question came up great changes would be effected. Another question that deserved attention was the tenure of office of Medical Officers of Health. It was certainly a most unsatisfactory state of things that after a lapse of many years the appointment should remain a matter of doubt and uncertainty. Medical men could not devote themselves so thoroughly and so earnestly to their work as they would wish when they knew that their appointment was insecure, and this naturally impaired their efficiency. The time was not far distant when the public would feel that their interests would best be secured by rendering the appointment permanent, and he had no doubt that when this change in public opinion took place, the Medical Officers of Health would be ready to concur in a scheme which would bring this about.

Dr. HIME (Medical Officer of Health for Sheffield) then read a very interesting paper on the recent outbreak of diarrhœa in Sheffield. After a minute account of the disease as affecting Sheffield, the population being classed according to age, sex, and in other ways, Dr. Hime entered into a detailed examination of the causes of the disease. The gravity of the ravages caused by diarrhœa is manifest, he said, from the fact that during the last twenty-eight years it has destroyed over half a million people in England. In 1878 diarrhœa was the eighth in order of the fatal diseases in England; in 1868 alone it caused 29,821 deaths. The generally favourable state of the public health of England during the past year was rudely disturbed by the somewhat sudden increase of diarrhœa in July. The rise of the wave was remarkably simultaneous throughout the country. From an elaborate table of the death-rate of the thirteen largest towns in the country, containing over six million inhabitants, and showing 7,072 deaths, it appears that the highest death-rate from diarrhœa occurred in Salford, where it amounted to 8.1 per 1000; next came Hull, with 7.3, both towns showing a considerable excess over the rate which prevailed in Sheffield. Among the causes of epidemic diarrhœa, Dr. Hime noticed that during the last thirteen weeks there was a remarkably low rainfall while the epidemic was severe. Again, a marked difference between the maximum and minimum temperature of the air accompanied a high rate. Dr. Hime remarked that there was much too great a tendency on the part of the public to sit still and expect the public authorities to make them and their surroundings clean; but he insisted that there was no special reason to suppose that the filth in the yard or in the sewers is more objectionable, or more likely to spread disease, than dirt in the house or about the clothes or person, except in special cases, when undoubtedly the poison of certain diseases may be in the excretion. But how frequently is this also the case with the dirt in the clothes? Dr. Hime therefore insisted on the necessity for personal and domestic cleanliness, as

being quite as important as anything which the public authorities can do to preserve the public health. It seemed to him hopeless to expect to remove zymotic disease unless individuals will do what they can to prevent domestic pollution. This would be considered one of the best preventive means possible.

Mr. HOLDEN (Hull) said that in the two weeks ending the 23rd June, there were in Hull only two deaths from diarrhœa; during the next two weeks the number sprung up to nine; the next week ten, the next forty-one, the next sixty-one, and the next eighty-two, but he was happy to say that in his last report the number was brought down to thirty, and he hoped to have a still more favourable report to make on the next occasion. Out of the 322 deaths from diarrhœa, 274 were under one year of age, while nearly all the remainder would be under three years of age, and there were only two or three deaths of adults. Of the latter only one was from pure diarrhœa, and the others were from the breaking up of the system and old disease. He quite concurred with Dr. Hime that the prevention of diarrhœa depended upon the attention paid to general hygiene, for it was not like infections diseases which could be isolated. It must be borne in mind that in almost all cases of a high death-rate from diarrhœa there was a low rainfall, and therefore atmospheric conditions had something to do with an outbreak of the disease. He visited the larger proportion of the cases which had occurred in Hull up to September, and he had arrived at the conclusion that the provocative cause and that exciting others was improper feeding. He, like Dr. Hime, did not believe that fruit eating had anything to do with bringing on the disease, for what could fruit have had to do with the cases of the 174 children who died at the age of one year and under?

Mr. W. MARSDEN (Mirfield) said that in cases where persons had been said to have died of diarrhœa he had been quite unable to assign death to that cause, and he was glad to find from Dr. Hime's paper that he did not stand alone in that particular.

Mr. G. GOLDIE (Leeds) believed that diarrhœa was a disease peculiar to a few coincidences of temperature. He believed that without similar atmospheric conditions—that was a temperature above 65, or a rainfall considerably lower than during the present year—diarrhœa would not have any special chance of becoming an epidemic. He was of the opinion that it would have a greater chance of becoming an epidemic where there was the densest population, the poorest people, and the most filth, either upon the surface, or where the subsoil was filth-sodden, and he was disposed to look favourably upon the removal of persons ill from diarrhœa from such neighbourhoods as a means of lessening the mortality. He believed that one cause of the disease was a dearth of heavy showers, for if there was a heavy rainfall there was at once perceived a decrease in the diarrhœa epidemic. It did seem peculiar that when there was a dewy morning and a sudden rising of the temperature at midday, there was a great increase of diarrhœa. This he found was a never-failing fact, providing there were the incidents of poor and dense populations, and he believed the more towns were scavenged the less likelihood there was of an outbreak of diarrhœa. He was not a disbeliever in contract work, but he believed the health of towns would be better if Corporations took the collection of offensive matter under their direct supervision, for wherever he found an accumulation of offensive matter he had detected a simultaneous outbreak of diarrhœa.

Mr. W. SYKES (Mexborough) said that children fed on starchy articles of diet were very subject to diarrhœa.

Dr. S. DREW (Chapeltown) believed that diarrhœa was due to climatic influences, and that it was of organic growth.

Dr. J. MITCHELL WILSON (Doncaster) said his opinion coincided with that of Dr. Drew. From the fact that there were few or no cases in workhouses in large towns he was disposed to think that filth was a large factor in provoking diarrhœa. Out of 55 deaths of children from diarrhœa which had occurred in the districts for which he acted as Medical Officer, he found that in 33 per cent. of these nuisances surrounded the case; eighteen children were fed by means of the bottle, twelve were bottle-fed and suckled, while only one was suckled alone. Nineteen had had a previous history of bad health, and in these cases diarrhœa was only a portion of the cause of death. In 14 per cent. the mothers seemed to infer that diarrhœa arose from the children cutting their teeth.

Dr. HIME, in replying, called attention to the fact that personal untidiness and a want of domestic cleanliness were the most frequent causes of low health. People had got a very constitutional tendency to sit quietly down, and cry, 'Good Lord, come and help us', and they thought that the Corporation ought to go to their houses every day, wash their faces, clean up their houses, and do all things necessary to bring about domestic cleanliness; but this was a most absurd and preposterous thing. He went on to remark that people attributed an outbreak of diarrhœa to the accumulation of offensive matter in the dust-bins; but in many cases they had as much offensive deleterious matter about their houses and persons as they had in their dust holes. Blame was also attached to the water, but in his opinion we had in Sheffield a most excellent water-supply; it came into the town, with few exceptions, direct from the mains, and it could not be put down as causing epidemics of this kind.

The CHAIRMAN, in bringing the discussion to a close, asked the members of the Association to furnish the Committee which had been formed to inquire into the cause of diarrhœa with reports of the cases which came under their notice.

Dr. DREW (Chapeltown) then read an interesting paper on 'Sanitation in Utopia', which the Chairman said was a sketch of sanitation of the future, and a description of the aspirations of those interested in that science.

The readers of the papers were thanked, and

Mr. S. L. SWANN, architect, gave the following description of the new Fever Hospital:—Having been asked by our Medical Officer to give a brief outline of the arrangement of the new fever hospital buildings in Winter Street, I have pleasure in acceding to your call, and have provided myself with a few of the practical points in connection with these buildings. The plans have been prepared on the pavilion principle, and are thoroughly detached from each other and divided into four sections, or four distinct blocks of buildings, with a space between the buildings of some thirty feet, and some fifty to sixty feet on either side. Besides the hospital blocks there is provided an administrative block with suitable outbuildings. The wards of the hospital blocks will give 144 feet super. of floor space, and 1,900 cubic feet of air per bed. Each block is capable of holding sixteen beds, eight on the ground floor and eight on the first floor. The beds, it is proposed, shall be

arranged along the wall spaces, having windows intercepting the spaces between the beds. All the windows are of large dimensions and are opened by means of sashes and pull-down pulleys, besides which every wall space between the windows is fitted up with Sheringham's ventilators, having direct communication with the outside. The conveniences and bathroom are off-shoots from the main building at an angle of 45 deg., and are isolated from the wards by means of well-ventilated lobbies. There are nurses' room and convalescent room on both floors, and an observant room on the staircases. The ground upon which the hospital is built is rather limited in area, being only 6,695 superficial yards, and the site so largely built round, that it was considered necessary to increase if possible the walking space or airing ground for the patients, and the only possible way of meeting this difficulty was by means of taking off the intended pitched roof and putting on a flat roof, which has been done, the same being enclosed by a stone parapet surmounted by iron palisades, thereby adding 550 yards of additional walking space for the patients. The whole of the drains are intercepted between the main drain of each building by air grates level with the finished surface of ground, besides having all down pipes connected with same to form shafts for ventilation. The wards are heated with an open fire stove standing in the centre of each ward, having fresh air communicated beneath the floors, which passes around the stove, and is generated into the ward, the smoke flue being the means of the exit of the vitiated air. Besides the open fire stove, hot-water pipes are arranged round the wards. These stoves and hot-water apparatus have been supplied by Messrs. Truswell and Co., of Sheffield. The administrative block is appropriated for matron, nurses, surgeon, kitchens and cellars, and various stores. The outbuildings comprise drying rooms (being fitted up by Messrs. Marshall, Watson, and Moorwood, of Sheffield), ironing room, laundry, and washing room. The disinfecting room is fitted up with the borough pattern disinfecting stove, by Goddard and Masseys, of Nottingham.

A vote of thanks was accorded Mr. Swann, and a slight discussion followed. The members then adjourned to the Health Office, Tudor Place, where they viewed a number of objects of special interest to Medical Officers of Health, which had been collected for their inspection by the exertions of Dr. Hime.

EXHIBITION OF SANITARY APPARATUS APPLIANCES, ETC., AT THE SANITARY INSTITUTE AT EXETER.

This, the first exhibition of the kind held in Exeter, was opened at the new Abattoirs, on Tuesday, September 21st, and remained on view up till the 9th of October. There were about 120 exhibitors, whose great variety of exhibits were ranged under the classes of (1) construction and machinery; (2) sewerage and water supply; (3) heating, lighting, and ventilation; (4) personal hygiene, foods and disinfectants; (5) articles of sanitary interest of a miscellaneous kind. The number of exhibitors fell greatly short of the total at Croydon last year on a similar occasion. Many, however, of the largest and best known manufacturers of sanitary articles were represented and made a valuable display.

Messrs. Capper, Son, and Co. (London), whose names have long been before the public, are the producers of the far-famed Pearson's patent trapless twin-basin water-closets, to which is added Jones's patent joint, described in the Sanitary Record of September 15th.

Messrs. Crossley, Bros. (Manchester) showed their 'Otto' silent gas engines, which are worked by igniting gas under pressure with air in the cylinder, by which great economy of the power-producing cost is obtained. These have recently been awarded first prize and certificate at the Sydney Exhibition. Over 3,200 have been sold since 1877, the demand still being on the increase.

Messrs. Steele and Wood (Stoke-on-Trent, and 9, New Broad Street, London) exhibited a collection of tiles for use in the decoration of fire-places, cabinet work, Dodd's string courses, lavatories, etc.; the vitrified colours protected by hard surfaces of glaze fused into a compact mass.

Messrs. Doulton and Co.—We should hardly conceive a sanitary exhibition to be complete without the admirable exhibits of Messrs. Doulton; and here is to be seen a large display of their stoneware closet-pans and traps. These have a strong vitrified body, with a white interior glaze, are faultless in construction, and require no metal pans. They have been sufficiently long before the public to need little to be said in their favour. We are also desirous of calling attention to Messrs. Doulton's varied display of strong vitrified stoneware kitchen sinks, traps, and urinals. This ware from its impermeability and its non-liability to corrosion, is particularly adapted to these purposes. These articles are of great durability and will withstand the action of the most powerful acids. Nor must we omit to note the display of open-air receivers, gas interceptors, waste-water preventing cisterns, automatic flush tanks, and their ingeniously designed opercular and channel pipes, with coping and valve for the distribution of sewage. Passing from the useful to the ornamental, we cannot fail to notice the fine display of articles made of the Sgraffito or Doulton ware, as applied to mantel-pieces, jugs, flower-pots, and numerous other articles; and, lastly, we would call attention to the carbon filters of this firm, which have been so long and deservedly noted for their purity, efficiency, and simplicity.

Messrs. J. and M. Craig (Kilmarnock) called the attention of sanitarians to Buchan's douche action or ventilating sewer gas trap, the peculiar advantages of which in preventing the entrance of sewer-gas into houses, and of making full provision for the ventilation of the soil and waste pipes, rendering them free from offensive smells and accumulation of gases, combined with simplicity of construction, and great cheapness, have been frequently noted in these columns. It is to be had in two styles, Nos. 1 and 2. No. 2 has an access opening upon the outer side of the trap, which is of great advantage in jointing, and is also serviceable for ventilating the sewer or drain beyond the traps when desired, rendering the drain always easy of examination. This has met with the approval of the highest sanitary and medical authorities, and is extensively used. Messrs. Craig are also manufacturers of glazed sewerage and water pipes, pans, and other sanitary fittings.

Mr. John Carter (6A, New Cavendish Street, Great Portland Street, London) exhibited his many ingenious contrivances for securing the comfort of the invalid, which are now becoming so deservedly popular. First, there is his patent invalid bed, with self-adjusting back action and commode arrangement; his invalid lift, invaluable in all kinds of accidents and affections which render a careful removal necessary, by means of which an attendant can raise the patient from the bed in a horizontal position, thus adding to the comfort and cleanliness of the helpless invalid. It is also capable of being utilised as an ambulance bed, and, by the addition of a cloth is convertible into a tent. It is equally recommended as a camp bedstead or garden hammock. We also here find his bed and writing tables, reading easels, invalid couches, carrying and Bath chairs—these latter are also to be had at a much smaller cost in wicker work—self-propelling chairs, exercising chairs, and many remarkable facilities, by means of which a patient may enjoy food, rest, and exercise, with the pleasures of reading or writing, in comfortable postures.

MESSRS. CHORLTON AND DUGDALE (Manchester) also shewed their desire to minister to the wants of the invalid, and the amount of success they have achieved, by the exhibition of their 'Matlock' invalid couch. This is an elegant and most desirable boon for the afflicted; of which we have already spoken in the highest terms.

MESSRS. C. H. SHARP AND CO. (104, Newgate Street, London) have a display of their crown ejector ventilators, for the effectual cure of smoky chimneys, and the perfect ventilation of public buildings, steamships, manufactories, etc., described in the SANITARY RECORD of Sept. 15th.

MESSRS. WM. WOOLLAMS AND CO. (High Street, Manchester Square, London) exhibit specimens of their block-printed wall papers, both of bright colours as well as of the more subdued tones now so much in vogue, all of which have the great recommendation of being guaranteed free from arsenic. The display included some very superior dado decorations arranged for staircases, dining and drawing rooms, etc.; also specimens of hand-finished embossed leather papers and patent embossed flock papers, which were peculiarly effective. As producers of non-arsenical papers, Messrs. Woollams have earned the approval of the profession and the gratitude of the public generally, who can now most certainly and effectually protect themselves from one great source of danger. To Messrs. Woollams, as we have already had the pleasure of stating, have been awarded the medals of the Medical Society of London and of the Society of Arts.

MESSRS. COTTERELL, BROTHERS, had a fine display of their specimens of wall-papers, including non-arsenical papers, designed in the 'Queen Anne and Early English styles'. They also call attention to their speciality in dado decorations for halls and staircases, the ground-work of which can be either painted with distemper or covered with washable paper. In addition to the above, they show their 'Sokliate', a solution for preventing injury to paper-hangings, distemper, or paint; also Manders's varnishes, to the merits of which we have already drawn the attention of our readers.

THE BRITISH SANITARY COMPANY (205, Buchanan Street, Glasgow) shewed their patent self-acting earth-closets, which claim the advantages of simplicity, strength of mechanism, non-liability to get out of order, for automatical action, and provision for the effective distribution of the deodorising material, thoroughly covering and absorbing all offensive matter and smells. The capacity of the deodorizing magazine is also pointed out as exceptional.

MR. WILLIAM WHITE (30, Wimpole Street, London) exhibited his patent water-closet flushing basin, with valve-less waste preventing apparatus, as also a number of patent bit taps and ball valves.

MR. WILLIAM BATHEN, C.E. (150, Lozell Road, Birmingham) had on view his patent man-hole cover, with dirt boxes and ventilators combined, as also a ventilator with flushing box, dirt boxes and lamphole cover combined. By means of these thorough ventilation is secured, the refuse which may enter the ventilator is easily removed, aud free access is given to the sewers for flushing and other purposes, also it effectually prevents solids from entering the sewers. These do all that is promised of them, and give great satisfaction.

MR. J. C. EDWARDS (Trefynant Fire Clay Works, Ruabon) had on view his patent 'Shone' hydraulic syphon ejector. This apparatus collects the discharge from the water-closets, etc., through the soil pipe, and the slops from the kitchen, scullery, etc., through the scullery pipe and tumbling box arrangement. The ejector when full will automatically shoot the sewage away through the house sewer with great velocity, thus providing a means of constantly flushing the house sewers by the sewage itself. It has the advantages of cheapness and effectiveness.

MR. PARKER (Woodstock, Oxford) exhibits his improved automaton earth closets, which are so arranged that by pulling a lever or crank at any convenient place or distance, two or three times a day, sufficient earth will be supplied and waste prevented. They are particularly serviceable for schools, union houses, hospitals, asylums, railway stations, jails, etc., and are extensively used.

MR. MOORE (Sekforde Works, St. James's Walk, Clerkenwell) sent specimens of the 'Louvre' ventilators for church windows, and for public and private buildings, which are effective and cheap.

MESSRS. STARK AND CO. (Torbay Iron Works, Torquay) had an extensive display of Cox's patent heating and ventilating stoves, and his 'Save-all' gas stoves and dispatch cookers, with the automatic lever gas-pressure regulator in working order; they also show a 2-man gas engine, (new patent) and McCormack's patent stocks and dies, expanding taps and patent wrench, all of which are well worth an inspection.

MESSRS. G. E. WEBSTER AND CO. (Central Chambers, Market Street, Nottingham) shewed their patent duplex gas burners, argand burners without chimneys, their patent photometer, which received the certificate of merit, 1879, of the Sanitary Institute, and a variety of heating, lighting and ventilating stoves. Messrs. Webster's system of lighting is that of passing a current of air through the centre of the flame, and so supplying the burner with hot air, and reducing or changing the black or dark portion into light, having the effect of giving double the illuminating power for the same consumption, or causing a saving.

MESSRS. DAVIS & CO. (Kennington Park Road) shewed, with a collection of scientific instruments, the Royal Polytechnic Barometer, giving Admiral Fitzroy's special remarks and general forecasts of changes of weather of all seasons. This is an exceedingly well got up desideratum. With this is also shown the A B C water-testing apparatus. Both of these apparatuses have the patronage of the Royal Agricultural Society.

S. AND E. RANSOME AND CO. (10, Essex Street, Strand) are calling the attention of sanitarians to their patent indestructible indurating solution as applicable to damp walls, roofs, etc. This claims to be an effectual preservative of stone and other building materials from decay, and also forms a complete barrier against rain penetrating through walls or tiled roofs, either from natural porosity of the material, from drip or overflow of spouts, proximity of trees, or from the force of wind driving the rain through. Ransome's process consists of the use of a special form of prepared silicate and prepared calcium; this gives a permanent cement of indestructible silicate of lime, which is deposited in every pore, and renders the surface impervious to moisture, at the same time hardening it.

MESSRS. FRANK PEIRCE AND CO. (1 and 2, Little York Place, London) had a display of sanitary appliances, including the 'Shrewsbury' patent valveless closet, ball valves, wasteless lavatory, etc., which have much to recommend them.

MESSRS. GARTON AND KING (109, High Street, Exeter) had an imposing display of sanitary articles in Classes 1, 2 and 3; among them we have Bradford's excellent Vowel E patent family washing machine, with wringer or mangle attached; Stidder's patent trapped universal valve closet, and patent side outlet valve closet; also the patent wash-out closet and trap, patent grease trap, a 4" surface trap, and a 4" drain trap; also a double action water waste preventer, and polished wood closet case, fitted with the patent water waste preventer, and Bostel's patent 'Excelsior' water-closet. These are all standard appliances which maintain the high reputation they at first achieved, and Messrs. Garton and King are doing good service in keeping them before the public. In addition to the above, we are asked to inspect a number of cooking and other grates. There is the 'Exonian', a complete and effective kitchen apparatus, the prices and sizes of which are such as to recommend its adoption by everyone who desires a cooking stove which shall meet every requirement of a large or small establishment. The 'Exeter' school grate, an open fire warm air grate with slow combustion, and the 'Queen's Own' grates, similar in principle, project into the room instead of being recessed into the chimney, and it is calculated will warm a given space by the distribution of warm air, in addition to the heat radiated direct from the fire, with the consumption of one-third the fuel used in an ordinary register grate with a sharp draught.

MESSRS. WILLS AND CO. (Armside Varnish Works,

Bristol) were present with a large display of specimens of their various varnishes, which include a varnish for white work, a hard varnish which will resist varying temperatures, carriage varnish, and a number of others, all excellent in their several ways.

MR. DAVID GILL (Fairleigh, Weston-super-Mare) exhibited specimens of his sanitary closet, fitted with twin door. These twin doors work singly or in combination. When both are closed a six-inch air space intervenes between them, and in combination each door acts respectively and simultaneously upon an outlet and inlet of fresh air, so that a current of air is maintained between the doors. They serve to separate water-closets, or any other compartment, both in respect to sound and air, whether of apartments in houses, wards in hospitals, or other buildings. With this is shown Gill's automatic-action water-closet, which effectually provides for the removal of effluvia when the closet is in use, and the danger of the receptacle becoming the generator of pernicious and poisonous air is guarded against. A chief feature in this closet is that every part of it is fixed on instead of under the floor as in ordinary closets, and thus prevents the possibility of the spread of sewer gases to other apartments on the same floor. It is made entirely of the best sanitary ware, and is consequently impervious to the effects of drain gases, while it is at the same time more durable. Mr. Gill is also an agent for Moule's excellent earth closets, which are too thoroughly appreciated to need more than a passing notice.

DR. F. CHURCHILL (4, Cranley Gardens, Queen's Gate, London) introduced to the notice of visitors to this exhibition a working model of his self-ventilating 'Disjuncta' closet, which has the great advantage of providing against bad smells. Its advantages are (1) that it is totally disconnected from all traps and house drains; (2) that it effectually carries out the well known sanitary law that 'all wastes should be cut off short and discharged into trapped receivers outside'; that the trap, though structurally inside, is practically outside as respects the contents. It is recommended as a substitute for, and would advantageously supersede the use of that objectionable article a commode.

MESSRS. BRAZIER AND SON (106, Blackfriars Road, E.C.) shewed their patent self-acting aromatic and deodorizing water-closet and drain purifier.—MR. WOODHEAD (Manchester Road, Bradford) a model of dry closet, with registered latch fitted to door; and Mr. JAMES WOOD (10, Skinner Street, Newport) his patent sanitary disinfecting vessel and appliance for portable commodes. These are all severally good, being well constructed, and making efficient provision against the evils they are intended to remedy.

MR. HENRY PHILLIPS (Heavitree, Exeter) exhibited his patent dry closet which, by means of the Archimedian screw, provides, on turning a handle, for the supply of earth and the simultaneous removal. This is simple and effectual in its action; there is also an inodorous urinal, which is deserving of inspection.

MESSRS. WIPPELL, BROTHERS, AND ROW (231 and 232, High Street, Exeter) had an extensive display of articles, and occupied a stand in each of the main buildings. Among their exhibits we notice the slow combustion 'Abbotsford' stoves, etc., and the 'Country Parson' stoves, Milbourne's patent chimney cowl, the wedge boiler, an instantaneous water heater for greenhouses, baths, etc. They also have a large and varied assortment of kitchen and cottage ranges, CAPTAIN WARREN'S patent cooking pots, and BOYLE'S patent ventilators. Nor must we omit to notice MULLER'S patent alpha gas machine. This apparatus for gas making is, as we have already stated, invaluable in all cases and under all circumstances, where there is no regular city or town supply, and is particularly serviceable for country mansions and churches. It has been imported into the island of Cyprus, where it was the means of introducing gas for the first time, and makes gas at a cost of four shillings per thousand. Under Class IV this firm also exhibits a large variety of water-filters, in terra-cotta and other ware, and some for special use in hospitals and public institutions.

MR. JOHN ALFRED STEPHAN (Rainbow Hill, Worcester) had a display of carbonised ironstone mound filters for sewage and water, as adapted to his patent system for the disposal of the sewage of towns. These filters were in action; water charged with aniline dyes and sewage matter coming away freed from all impurities, and crystal clear in appearance. The filter itself is composed of ironstone earth which, mixed with sawdust and burned when in a plastic state, is capable of being moulded into any form, and is serviceable for jars, drain-pipes, and the like. The constituent parts of iron-stone earth, viz., alumina, silica, magnesia, iron, and lime are all purifying agents. Mr. Stephan also exhibits his new patent material for heating and lighting by incandescence.

MR. A. T. ANGELL (144, Fulham Road, London) sent his patent air-tight sewer flap for covering over inspection-pipes from drain and grease traps under scullery sinks. This trap is perfectly air-tight, and prevents the escape of smells.

MESSRS. CANDY AND CO. (Great Western Pottery, Chudleigh Road Station, Newton Abbott) exhibited two full-size models of their registered perfect drain ventilator, with double water traps, air chambers, and sink gas excluder, in one piece of impermeable stoneware. This is a sanitary article which has met with favour from sanitary engineers, architects, and others, and received the first bronze medal at the Royal Cornwall Polytechnic Society's exhibition. They also came forward with a large display of glazed stoneware sewer-pipes, of an indestructible nature, being known to resist a pressure of 100 lbs. to the square inch. They shewed a model of an improved sink and stench trap, with movable dirt bucket for preventing choking of drains, etc. The iron grating and bucket can be instantaneously removed and replaced without untrapping the drain; also a mason's trap in one piece of ware, and a 'tip-up' lavatory basin and stand, an exceedingly neat and economical article for the use of School Board Schools and public institutions.

MESSRS. WILLEY AND CO. (Exeter) had a fine assortment of gas cooking stoves, among them the Leicester kitchener, No. 492, with plate warmer and griller combined, and fitted with grid-pan and heat-deflector for griller, roasting and baking oven, burners for baking, lined throughout with patent non-conducting material, by means of which a saving of 40 per cent. of gas is guaranteed. The temperature of the oven is raised to 450 degrees (baking heat) in five minutes from lighting burners. This kitchener was tested at the Coventry Gas Apparatus Exhibition with the following result:—leg of mutton, 7¾ lbs.; piece of beef, 4 lbs.; sausage, 1¼ lbs.; total weight, 13 lbs., cooked in 51 minutes, consuming 21 1-10th cubic feet of gas, cost of gas at 3s. 6d. per 1,000 feet, ¾d., quality of cooking, well done.

The well-known firm of GEORGE T. TONKS (of Birmingham) exhibited a frictionless balance supply valve, Meakin's patent, for high pressure. These are well adapted for a constant supply of water at high pressure.

THOMAS DAVIS (of Exeter) had on view a cistern containing two compartments; *a* to hold water for drinking purposes, *b* for flushing closets; the advantages put forward are, that whilst there is a constant supply of water in *b* for flushing purposes, the water in *a* is practically shut off from *b*, and so kept free from sewer gas.

MR. PHILLIP (of Newton Abbott) displayed a collection of sanitary pipes, gulley traps, syphons, and glazed tiles, etc.

MR. HEAD (Exeter) showed, on behalf of the West of England compressed Peat Company, Limited, Exeter and Rathbrook, Dartmoor, some samples of peat and peat charcoal. This peat is remarkable for its density and quality, and it is stated, from experiments made, to promise to be the great sanitary and manuring agent of the future.

MESSRS. SCAMMELL (of Exeter) had on view test briquettes of cement and concrete from Messrs. Hilton and Anderson, London; also portland cement broken at seven days, after six days' immersion in water, at 652 lbs. per square inch, also paving bricks, stoneware pipes, etc.

MR. ROBERT H. GRIFFIN (40 and 41, Kirby Street, Hatton Garden) shewed a number of his patent ventilating

and heating register stoves, which claim many advantages, and had been well received by architects and the profession generally.

MR. J. WILLIAMSON (40, Kirby Street, Hatton Garden) had a large and most varied display of hot plate, cheerful boiling, cooking, duplex and other stoves.

THE WILSON ENGINEERING COMPANY (Pear Tree Street, Goswell Road, London) called attention to the Wilson portable cooking range, which was favourably commented on in the SANITARY RECORD of Sept. 15.

MESSRS. H. C. DAVIS AND CO. (200, Camberwell Road, London), displayed 'Family', 'Cottage', and 'Artizan' gas kitcheners and grillers and cookers; also laundry stoves, gas-boiling stoves, bread toasters, Asbestos gas fires, Auckland breakfast cooker, and a number of cooking utensils in enamelled wrought iron.

MR. THOMAS LLOYD (Winchester) entered the lists with samples of his ventilators for buildings, ship cabins and railway carriages, ventilating shafts and chimneys.

MR. P. HINCKES BIRD, F.R.C.S. (1, Norfolk Square, London) exhibited three models illustrating his useful plan of 'costless ventilation', which thoroughly carries out the promise of its title.

MESSRS. ROBERTSHAW AND CO. (51, Bury Street, New Road, Manchester) shewed appliances for the effectual removal of night-soil, and lay themselves open to undertake contracts for a given time at a charge not exceeding 3s. 6d. per house per annum for this kind of work, and promise that no nuisance shall arise from their system.

MESSRS. J. S. FRY AND SON (Union Street, Bristol) had an excellent exhibit of malted cocoa extract, milk paste, Caraccas cocoa, homœopathic cocoa, cocoa extract, and chocolate, as also chocolate bonbons. The name of this old established firm is sufficient guarantee for the excellence of these articles.

THE SILICATED CARBON FILTER COMPANY (Battersea, London) exhibited a selection of their admirable silicated carbon domestic, dining, table, and pocket filters.

MR. EUGENE RIMMEL (96, Strand) showed his neat and useful aromatic ozoniser, ozonised perfumes, ozonised, carbolic, and coal tar soap, and other disinfectants.

MESSRS. F. C. CALVERT AND CO. (Bradford, Manchester) showed their well-established preparations for disinfecting purposes, carbolic acid, disinfecting and hygienic soaps, and their improved vaporiser.

MESSRS. MACKEY, MACKEY, AND CO. called attention to their oxychlorogen, anilizer, epilixon, and other articles with which their names have been so long and popularly associated.

MESSRS. VAN PRAAG AND SON (9, Crown Street, Soho) shewed their table and other filters, and patent boiler stove collectors.

MR. H. P. BOULNOIS (Exeter) had on view a model of a patent sewer gas annihilator, as applied to a stoneware socket pipe sewer, described at the Sanitary Congress just concluded.

MSSSRS. R. BOYLE AND SON (64, Holborn Viaduct) shewed a large plan of their complete system of ventilation and sanitation, as also their self-acting air-pump ventilator, etc.

The following are the names of the judges appointed to make the awards: Dr. Bartlett, Dr. Corfield, Rogers Field, Esq., C.E., W. Eassie, Esq., C.E.; but the result of their examination will not be made known until a meeting has been held.

The Local Board, and Working Men's Club at Alnwick, having applied to the agent of the Duke of Northumberland to know on what terms His Grace would grant sites to working men for the erection of suitable houses for them in that ancient town, where they are much needed; it has been intimated that sites would be allotted at a ground rent of a penny per annum per yard, on a ninety years' lease. These terms, however, have not given universal satisfaction.

REVIEW.

Health and Comfort in House Building; or, Ventilation with Warm Air by Self-acting Suction Power. By Drs. J. DRYSDALE, and J. W. HAYWARD. London and New York: Spon. 1876.

This is a second edition of a work which appeared some few years ago, and its object is to prove that what is called a 'whole house system' of ventilation is quite possible of realisation. The authors specify for a sufficient inlet of air, but object to supplies of cold air direct from the exterior atmosphere. They would have the air changed frequently in the room; but the room ventilation should not be a law unto itself, but rather a part of a commandment obeyed by all the rooms in common. A breeze of air, however beneficent in the open, is to be objected to when it takes the form of a draught inside the house. And it is to provide that inlet of pure warm air, without draughts, and to remove the vitiated air sufficiently often, that these gentlemen each built for themselves a house upon their own principle, and now expound the system to the public.

The authors desire to make the inlet openings for fresh air, and the outlet openings for foul air, special and permanent, and not liable to be deranged by the caprice of the moment. The inlets are, therefore, taken from a warm corridor or lobby, which is filled with warm air generated in a special chamber below in connection with the outer air, and thus warm air is led, for instance, to the cornice of the room, opposite the fire. The outlets, which are apportionately reduced in size to the outlet arrangements, are also at the top of the room, and these lead to a main abstraction shaft. The outlet for a dining-room should be calculated for a dinner party, and that of the drawing-room for a ball, and should be capacious enough to carry off at least fifteen cubic feet per minute for each person. The inlet should be much larger, because it has to supply the fire in the room, and the gas-burners, if any, and should therefore in sectional area equal at least the size of the chimney throat *plus* the area of the collected foul air outlets. The inlets should always be on the wall opposite the chimney, because the fire will then draw the air across the room, and cause it to circulate properly. The enlargement of the inlets, as compared with the outlets, prevents currents also, as, if more air comes in than goes out, there will be no appreciable currents, and the foul air will disappear under pressure. When the reverse is provided for, that is, when the outlet's sectional area is in excess of the inlet's, currents are sure to be disagreeably established.

Fresh air having been taken into the house, warmed and delivered to the various rooms, by a system which is practically automatic, it follows that the abstraction of the foul air should be equally self-working: and this is easily achieved by our authors. From the openings in the ceiling, the foul air from each living-room, or bedroom, or closet, the foul air passses into a flue, which terminates in a common chamber, in separate fashion—for in no other fashion can the suction act equally on each room—and this chamber of foul air is in its turn connected with a common shaft, up which is maintained an upcast action, by its being kept permanently heated. This general flue can be kept perpetually heated by a jet of gas, or a few coils of hot-water pipe; or, better still, it can be brought down below the kitchen floor, carried up behind the fire,

and around the smoke flue, and stopped off at chimney-top height. The heat thus imparted by the flue would suffice to impart an upcast power, which would, practically, last for days after the kitchen fire was put out.

In a house thus treated, provided that the recommendations of the authors be sensibly carried out, many of the discomforts of rooms ventilated according to the ordinary principles would disappear. A person need not then be hot on one side and cold on the other, plagued with kitchen smells in the drawing-room, or tobacco smoke in the lobby, and even the water-closet would cease to declare its vicinity to visitors. The rooms would all of them receive an ample supply of fresh air, distributed equally and without current, cooled from 5 to 10° in summer, and warmed from 10 to 30° in winter, that there need be no greater difference in temperature in them, throughout the whole year, than 8 to 10°. The hot-water pipes in the primary inlet will keep the air warmed to about 65°, and ice there will, in the same way, prevent the temperature from exceeding 65°.

There is no doubt that our authors have succeeded in doing all this, for they each built a residence for himself in Liverpool, and careful observations have been made of the currents of the air within them. The current-motors in the primary and secondary inlets, in the room outlets, in the downcast shafts, and in the transverse and upcast shafts, all worked in harmony, whether examined before or after the fire was lighted. A good kitchen fire, it appears, with its boiler in action, gives an increase of 20° in the upcast shaft in winter over the out-door temperature, and this is equal to a velocity of 220 feet per minute. The upcast shaft area of four square feet would, therefore, remove, as a rule, nearly a thousand cubic feet of air, plus that removed up the chimney, and this would supply, in round numbers, fifteen cubic feet per minute, to thirty-eight persons in the house at one time, or, with fires burning, 4,500 cubic feet of fresh air every minute, which is sufficient for 300 persons.

We must recommend our readers to study the book for themselves; and we give this short and incomplete notice of the work as an inducement for them to do so. It is most lucidly written; full of experiments, and replete with information.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

RATS AND LEAD-PIPES.

Mr. W. Eassie's letter on 'Rats and Lead-pipes', in the August number of the SANITARY RECORD, reminds me that some of my experiences on this subject may interest your readers. For some years I have been carrying out a reformation in the sanitary arrangements of this institution. For my present purpose, I need only say that this involved the removal of all drains and soil-pipes from the interior of the building, and of water and gas-pipes from covered recesses in the walls. The asylum was built twenty-three years ago, and during that period rats had become very numerous, specially frequenting water-closets, bath-rooms, lavatories, kitchen, and sculleries; and I need hardly say that the united efforts of dogs, cats, ferrets, and trappers, were but partially successful in reducing their numbers.

Mr. Eassie incidentally refers to a prevalent belief that rats cut lead-pipes to get at water. I am not aware of any facts supporting this theory; but, judging from what I have seen, I believe they gnaw a pipe, as they would any other gnawable substance, when it obstructs their passage from one place to another. I will give a few of many examples met with illustrative of the power for evil of these rodents:—

Some years ago several of the officers became ill, complaining of sickness, loss of appetite, and general *malaise*. An odour, as of sewer gas, was perceptible in the central or administrative block, especially at night, when the house was warm and the windows and doors closed. The source of the smell was traced to a water-closet on the ground floor, and on unearthing the soil-pipe to its connection with the fire-clay drain under the basement, a large, irregular-shaped hole was found to have been gnawed by rats from the inside, close to the imperfect joint, evidently as a passage of ingress from the drain to the house.

When the Asylum was built a large common water-supply cistern was placed in the roof of the centre block, and (as was the custom of the day) a three-inch lead-pipe was carried in a flue in an inside wall to an untrapped soil-pipe. A smell of sewage was often observed by workmen in the roof, and this overflow-pipe was suspected. An alteration in the water-supply rendered the cistern unnecessary, and the overflow-pipe was carefully closed. The smell, however, continued, and on removing the pipe from end to end a hole two inches in diameter was found to have been gnawed by rats from the outside, near the cistern, while there were numerous evidences elsewhere of attempts to gnaw it from the inside.

As instances of water and gas-pipes being cut, I give the following:—The supply of hot and cold water to one part of the house was conveyed in lead-pipes, concealed in a recess in the wall a little larger than admitted the passage of the pipes. This flue was a favourite highway for the rats between the various floors, and came to be known as the 'rat-trap', for the following reason: During the night and early morning, when the contents of the hot-water pipe were cool, the passage was clear for the rats; but when the water was brought suddenly into circulation by running it off at the taps in the morning, the pipe expanded, forming an arch between two fixed points, and if an unhappy rat happened to be on his travels at the time he got nipped between the expanded pipe and the mason work; sometimes he managed to effect his escape by gnawing across either the hot or cold water-pipe, but more frequently he was held there till the stench of his mortal remains necessitated the removal of the boarding covering the flue. I have met frequently with gas-pipes gnawed through, causing of course a great and unsuspected waste of gas; and once the house had a narrow escape of being set on fire by the gas from a cut pipe finding its way under the floor of a room into a chimney, where it became ignited.

The only means of escape from insanitary and other dangers caused by rats in houses and hospitals, is, I believe, in strictly carrying out the principles referred to in the beginning of this letter, viz., abolish internal drains and soil-pipes, and place pipes of all kinds *on* walls, and not *within* them. It is, perhaps, too soon to speak positively as to the permanent expulsion of rats; but it is a fact that whereas they swarmed in this institution by hundreds, they have in the meantime all but disappeared, and I think there is ground for hope that now that their haunts have

been rooted out, they have taken their departure for good. At all events I feel quite sure that they can never be such a source of danger in the future as they were in the past.

JAMES C. HOWDEN, M.D.,
Medical Superintendent.
Montrose Royal Lunatic Asylum,
October 25th, 1880.

THE RIGHT OF THE PEOPLE TO BREATHE AN UNPOLLUTED ATMOSPHERE.

As I perceive that your attention has been already directed to the question of the ventilation of drains, I beg to refer to the plan which I recently brought before the Public Medicine Section of the British Medical Association Meeting at Cambridge. Every day brings further corroboration of the views then enunciated, and which I am in hopes will shortly be put into practice at a northern health resort. At the present time I have to put my hand in my own pocket and pay extravagantly for liberty to avoid typhoid fever, for it is no easy matter to keep out of one's house the accumulated gas of half a mile of sewers in a populous neighbourhood. Various plans are proposed by architects, tending to increase their own gains, and putting householders to this unreasonable expense; but I am contending for a remedy which will render it quite unnecessary for individuals to attempt to carry out what ought to be public sanitation. The pressure of sewer gas, which I have alluded to, cannot be dealt with by dragooning the public into individual study of this question. It is multiplying a hundredfold the actual expense, trouble, and risk of failure to force private people to make adequate provision for carrying off gas under high pressure. If they desired to do so, many houses being on the slope of a hill would only become nuisances to those at a higher lever; and the same objection would apply to this plan which does to that of utilising the lamp-posts for the exit of sewer-gas. The only reasonable plan has never yet been fairly tried on anything like an adequate scale to serve as a model for municipalities. True, it has been tried locally, but only by private persons, who have utilised the shafts of their factories for this purpose. But the shaft at Brighton is only a burlesque of this plan, as it is low down in the intercepting sewer, and all the gas would obviously rise above it, and so escape by the ordinary gully-holes.

All shafts for sewer ventilation must be placed on the higher levels, and, in a populous neighbourhood, as many as are necessary must be erected, in addition to such well placed factory chimneys as the owners will permit to be so used for a reasonable remuneration.

When a plan like this has been carried out in London on a proper scale, one of the chief factors in producing the disgusting mixture known as London fog will have been removed.

The other principal factor is our atrocious waste of fuel. I have a right to warm myself; but not to poison the atmosphere with unconsumed carbon. At least I ought to be willing, and I am willing, to pay for my share of the nuisance.

I propose, therefore, that a *small* tax be imposed at first on open fires, just sufficient to get rid of the income tax (and a very trifling rate will be sufficient); and afterwards, when there is sufficient knowledge diffused among the public by the discussion consequent thereon, a larger tax, which may compel people to, at all events, consider their ways, whether they are just and equal towards the rest of the community.

When this is done, London will again become habitable by persons of refinement, who now exercise their right of choice by living outside its smoke-line, to the great depreciation of much valuable property. In asking the people to pay for extra shafts, and endure an additional tax, I may seem to be indifferent to the burdens under which we all are groaning; but it is not so. It is to save money that I make the proposition. It will also save life and labour; and all furniture and other commodities at present destroyed by grime and sulphurous acid, will be made to last at least twice as long; whilst almost everyone who lives in town, will have some years added to the span of his existence.

Allow me, Sir, to ask for your powerful advocacy of this great reform. Half the labour at present necessary in our houses arises from the necessity of perpetually dusting, and carrying in coals and removing ashes, which in these days of science is surely an anachronism.

EDWARD HAUGHTON, B.A., M.D., &c.

DISINFECTION.

Is it necessary to disinfect the feathers of a bed, stuffing of a mattress, and wash the ticks after cases of diphtheria? CAMBRIA.

[It is doubtful whether or not it is absolutely necessary to wash the ticks of bed and mattress after a patient's recovery from diphtheria; but unless they have been covered with cases, it is advisable that they should be washed. But there is no need to disinfect the feathers or the stuffing of the mattress, as the infective matter of diphtheria does not appear to be so subtle as that of scarlet fever, small-pox, and measles.—ED.]

HOT-WATER APPARATUS.

I am just about to have a bath-room fitted up, which will be supplied with cold water only. I should be extremely obliged to you if you would kindly tell me what is the best apparatus to get that will supply hot water readily but cheaply.

Nov. 11, 1880. L. M. G.

[Ewart & Son's 'Crown' Instantaneous Water Heater will answer the purpose very well.—ED.]

PLUMBERS' FITTINGS.

Being a working tradesman, and having a grievance (I have no doubt all, or nearly all, of my 'brother chips' have the same), I will thank you to let me state it in your journal.

It is with regard to the brass fittings sent out by many firms, even of good repute, for the use of plumbers. I refer especially to ball-cocks, which I suppose are made 'piece work'. They are handed over to the foreman or principal as complete; the man is paid, and the cocks are taken to the store, and from thence to the market. I get some of them, and start, perhaps, ten or fifteen miles from home to complete a job by fixing one or two, as the case may be. Before leaving the job, which may have been in hand some weeks, I turn on the water to test the work done, and then proceed to examination. I find ball-cock leaking; bib-cock with screw bottom (low pressure) leaking; valve of service box, ditto; fan of W.C. basin at the bolt-holes, ditto; if a common pan closet, water running out of hole in re-

ceiver, where the carrier of copper pan passes through; sometimes the copper pan itself leaking; and lots of other like defects, which sorely try one's temper.

These matters are very annoying, especially when at a distance from home, necessitating perhaps a special messenger for other articles to replace the defective ones. It is evident there is not proper supervision of the work, after leaving the workman's hands, at the manufactory; and if this letter lead to a ventilation of the matter, so as to convince makers of the necessity of a closer inspection, and thereby prevent the laxity which is evidently displayed by those who have to pass the work from shop to store, my desire will be attained. G. G.

Cornwall, October 23rd, 1880.

HOUSE PLUMBING.

In 'Notes of the Month' (page 93), you invite the opinion of your readers on cast iron soil and drain pipe construction as promulgated by the New York Board of Health. After many years' experience in house-plumbing, I am of opinion that cast iron pipe, such as is used by our friends across the Atlantic, is the most suitable material for soil and drain pipes. The superiority of iron pipe over lead is not a matter of experiment, but a demonstrated fact. Lead is affected by hot water passing through it, and is often destroyed by rats, besides being subject to many other injuries during and after the erection of the buildings in which it is fixed. Iron pipe has none of these objections, and when once placed and stayed in position, there is no chance of leakage. The ordinary cast iron rain-water pipe so extensively used in many of our suburban districts for soil and waste water purposes is neither sound nor reliable, the sockets being bad for secure jointing. The American firms manufacture pipe and necessary fittings, well adapted for this purpose, it being strong and with a smooth surface, and with sufficient space and strength in the sockets to get a sound caulked joint of lead; and the introduction of similar pipe and rules in this country, I think, would be advantageous. Referring to iron drain-pipe generally, I should not consider it suitable for underground drainage. Glazed Staffordshire ware is preferable and more durable below the ground line. W. G.

Eastbourne, Sept. 25th, 1880.

SOIL-PIPE AND CLOSET APPARATUS VENTILATION.

Dr. John Shea's able letter (pp. 113, 114), on 'Soil-pipe and Closet Apparatus Ventilation', is very interesting, and shows a large amount of energy and research in sanitary fittings, and as his sketches and remarks are based on considerable experience, I beg leave to follow him in a friendly way of criticism, as far as, 1st, Diagram D. This sketch is not exactly in accordance with Norman Shaw's soil-pipe system. Mr. Shaw's method is to leave the foot of the soil-pipe open, and several inches above the 'opening to trap' into which the pipe delivers; the foot of the soil-pipe and the opening to trap being protected and ventilated by a strong iron grating level with the ground line. 2nd. The D trap, under the apparatus described as the 'old-fashioned complex closet' is entirely misleading. Such a 'trap arrangement' as shown in diagram would soon become a nuisance, neither does it fairly represent the D trap, and the aperature near the top of the trap at O is absurd; it would permit foul air to pass freely into the house. Certainly any trap, S or D, can be mutilated in the fixing or making by poor workmen. Good plumbers place the dip-pipe of a D trap close to the heel of the trap, in order to give the contents free passage to the 'outgo', and they also see that the dip has one inch water seal. I do not wish my remarks to be construed into a defence of the copper-pan iron container and D trap, because I believe they will soon become things of the past, and replaced by such as Mr. Buchan's 'Carmichael' washdown (p. 116); the pan and trap accessible and above the floor line.

Eastbourne, Sept. 24th, 1880. W. G.

PUBLIC HEALTH AT THE ANTIPODES.

I have been for some time Medical Officer of Health for an improvement area district, which includes a city and surrounding suburbs, presided over by a Board of Health for the entire district.

Quite recently, the City Authorities have had delegated to them within the city almost all the powers under the Health Act; I still remaining Health Officer for the combined district, and the Board of Health still retaining in its own hands the appointment of Medical Officer. The city has an inspector, but he is in no way under my control, and I am in no way bound to the city. In fact, the Board of Health wishes to delegate its functions to the combined bodies, keeping one Health Officer for them all. If you will kindly give me a few hints how I can best manage to carry out my duties with satisfaction to all parties concerned, I shall be exceedingly obliged to you.

AN ANTIPODEAN SUBSCRIBER TO THE SANITARY RECORD.

[In England there is no such divided responsibility in health matters as seems to obtain in New Zealand. Here there is a sanitary authority for each and every place in the kingdom, and no more than one. Our English experience, therefore, would be of no value in this instance. Our correspondent does not state in what relations the new City Authority is with the improvement commission of which he is Health Officer. The fact that the city has an inspector who is not under his control is certainly unfortunate; but the same state of affairs exists in England, and is found possible of being surmounted by tact and discretion on the part of the Health Officer. With the imperfect information we have before us, we do not find ourselves able to do more than suggest that our correspondent should continue reporting to his Board of Health the sanitary defects which come to his notice as their Health Officer, leaving to them the responsibility of addressing the City Authorities if they see fit. Until his functions have been curtailed by the removal of the city from his jurisdiction, clearly no difference has been made in his position or duties.—ED.]

COMPULSORY VACCINATION.

The proposed legislation on this subject has of late raised comments in many newspapers, but in no one comment known to me have the arguments for and against vaccination been clearly separated from those on its compulsory aspect, nor have the points essential to each side of the case been so concisely stated in juxtaposition as to present a clear case for readers to exercise their judgments on. I submit that the subject should, in the interests of the nation,

be thus clearly stated, and claim your assistance in publishing such statement.

The claims in favour of vaccination are: That vaccinated persons are less liable than unvaccinated persons to have small-pox. That those vaccinated persons who have small-pox, have it in a less severe form than unvaccinated persons have it. That the small-pox death-rate among vaccinated persons is smaller than among unvaccinated persons.

The contention against vaccination is: That in certain cases of vaccination, the vaccine lymph is a direct means of transmitting disease from the person or animal, the source of the lymph, to the person or animal vaccinated by its means. That disease, in all its transmissible forms, is transmissible by means of vaccine lymph directly from the person or animal, the source of the lymph, to the person or animal vaccinated by its means. That a full knowledge of the health of the person or animal, and of the health of the progenitors and associates of the person or animal, from which, and of the manner in which, any given vaccine lymph has been obtained, does not necessarily include a knowledge of whether such lymph is incapable of transmitting disease directly from the person or animal, the source of the lymph, to the person or animal vaccinated by its means. That there is no known way of demonstrating, by analysis or otherwise, that any given vaccine lymph is incapable of transmitting disease directly from the person or animal, the source of the lymph, to the person or animal vaccinated by its means.

All the claims in favour of compulsion in vaccination which have become known to me assume: That to restrain, constrain, or punish persons who have not committed an overt act under the law of equal freedom is equitable; I therefore pass them and state the contention against compulsion in vaccination. Alexander Pope has, for Englishmen, summed, in phrases at once accurate and beautiful, the life-temper or law of sympathy between man and man, which is the right basis of social manners:—

'Never elated while one man 's oppress'd,
Never dejected while another 's bless'd.'

The first of these lines has been clearly formulated by Herbert Spencer thus: 'The limitations to action—the degrees of freedom and restraint, shall be alike for all. Each shall have as much liberty to pursue his ends as consists with maintaining like liberties to pursue their ends by others; and one as much as another shall have the enjoyment of that which his efforts, carried on within these limits, obtain.'

Based on this statement of equity, the contention against compulsion in vaccination is: That to restrain, constrain, or punish persons who have not committed an overt act under the law of equal freedom is inequitable. That the avoidance of vaccination does not constitute an overt act under the law of equal freedom. That compulsory vaccination restrains, constrains, or punishes persons who know that vaccine lymph is a transmittor of disease directly from the person or animal, the source of the lymph, to the persons vaccinated by its means, who fear contagion by vaccine lymph, and who have not committed an overt act under the law of equal freedom. That compulsory vaccination is therefore inequitable.

That which equity has to say in the matter of small-pox is this: When a person has a contagious disease—as small-pox—he, as a spreader of cells or germs, which, in relation to other persons, have an actively poisonous character, commits an overt act under the law of equal freedom; and society may equitably say to him, 'You must, while in this state of disease, *avoid* such and such actions, because such actions, by one in your state of disease, if they affect other persons at all, cannot but tend to destroy their well-being.' And society may thereafter equitably use force to ensure the avoidance of the specified actions and enforce penalties for the non-avoidance of them.

FRED. W. FOSTER.

LEGAL NOTES AND QUERIES.

THE PUBLIC HEALTH (INTERMENTS) ACT.

I should be glad of your opinion upon the following questions, which arose out of the Public Health (Interments) Act of 1879. 1. How near to an existing dwelling-house may a cemetery provided under the Act be erected? We have a very eligible site, both as regards soil, slope, and situation, but it is near some cottages. 2. How is the cemetery, when provided, to be administered and worked? YORICK.

[Section 10 of the Cemeteries Clauses Act, 1847, which is incorporated with the Interments Act, requires that a cemetery shall not be constructed nearer to any dwelling-house than 200 yards, except with the consent of the owner or occupier. The consent in writing of such owner or occupier must therefore be obtained before the site can be made available for burial purposes. Curiously enough, however, whilst cemeteries provided by *sanitary authorities* must not be within 200 yards of an existing dwelling-house, cemeteries provided by *burial boards* may be established within 100 yards of a dwelling-house, or half the former distance. In the original Burials Act of 1852 (15 and 16 Vict., cap. 85, sec. 25), the distance was the same as in the Cemeteries Clauses Act of 1847 (*i.e.*, 200 yarls); but by the Burials Acts of 1854 and 1855 (17 and 18 Vict., cap. 87, sect. 12, and 18 and 19 Vict., cap. 128), the distance was reduced to half that length. It may be added that in France no cemetery may be erected within 100 mètres, or a little more than the same number of yards, from a dwelling-house. 2. As regards the regulation of a cemetery after it is established, the extension to cemeteries of the powers given to Sanitary Authorities by section 141 of the Public Health Act, 1875, with regard to mortuaries, will enable an Authority to make by-laws for the management and charges for the use of the cemetery, and in this way to provide for the orderly conduct of all persons within its limits, for the regulation of graves, and for the payment of reasonable fees for interment therein.—ED.]

HOSPITALS FOR INFECTIOUS DISEASES.

The question of power under the 124th section of the Public Health Act, 1875, to remove patients suffering from any infectious disease to an hospital provided for the reception of those cases, is one which is open to much discussion. The section cannot but be regarded as a very unsatisfactory one for Local Boards and their officers to act upon. For compulsory removal, the first stipulation is that the patient shall not have 'proper lodging or accommodation', and this is so wide a definition as to mean almost anything. What Medical Officer of Health or Inspector of Nuisances would consider that more than one family in one room was 'proper lodging or accommodation'? And yet this is specially mentioned as a further contingency where compulsion may be resorted to.

I take it for granted that the third proviso, 'ship or vessel', would take in canal boats, although I am sure it would be deemed more satisfactory if these boats were included in the definitions, as they are, without doubt, a ready means of bottling up and spreading infection in every town where they lie up, or through which they may pass.

All these cases, however, may be removed to an hospital by the order of *any justice;* but if it be the lodger in a common lodging-house—not the person who forms one of two or more families permanently domiciled in one room—then the section says he may be removed by 'order of *the Local Board*'.

Where is the nicety of distinction in these cases that the power should be thus arbitrarily divided?

Loughborough, Oct. 1st, 1880. JAMES MAGUIRE.

OWNER OR OCCUPIER?

Would you kindly give me your opinion to the following case:—A, being the occupier of a house for some time, left the house on the 9th of this month; four days after complaint was made to me that A had left a quantity of offensive refuse in a closet of the same house. I visited and found the complaint quite true. I afterwards found out where A had gone to, and gave notice in writing as required under the 'Public Health Act', section 94. A refused to comply with the notice. On the case being before the magistrates, it was dismissed on the ground that I had summoned the wrong person—that I should have summoned the owner and not the occupier. I should be obliged if you would favour me with your opinion.

J. J. HINDMARCH,
Sanitary Inspector, South Shields.

[Our correspondent, on his own showing, summoned the wrong person. The Act requires him to proceed against 'the owner or occupier'; at the time he took out his summons A was neither owner nor occupier. The decision of the magistrates was quite correct.—ED.]

THE DAIRIES, COWSHEDS & MILKSHOPS ORDER, 1879.

Has the above order become a dead letter? Outbreaks of fever through the country are of frequent occurrence, often extending over several streets, the cause of infection in very many instances being traced to the milk-supply. Placing the order under the supervision of the Police has proved a failure: they have neither the time, nor have they been trained to the work. The Contagious Diseases Act, 1878 (under which this order is made), is carried out by the Court of Quarter Sessions. The order has been in existence nearly two years without being put in force. Surely it is time that the Local Authorities should appoint persons of practical experience to work the order thoroughly, and thus prevent the so frequent recurrence of this evil. Until all places where cows are kept and milk is sold to the public be inspected as regards their sanitary arrangements, means of drainage and ventilation, and their water-supply, if suspected, analysed, we cannot expect to be safe from these preventable outbreaks. L.

[We are afraid that, as regards counties at least, the Dairies Order of Council of last year is, in fact, a dead letter. The imposition upon the local veterinary authorities of the duties of regulating and supervising dairies has met with universal condemnation.—ED.]

THE UTILISATION OF LONDON SEWAGE.

A Bill with the above object has received the Royal assent. The Dagenham and District Farmers' (Optional) Sewage Utilisation Act, authorises the formation of a company, and the construction of works, for the delivery of London sewage to the occupiers of some 9000 acres of land on the Essex side of the Thames, between Barking and Wennington. The essence of the project is pointed to in the word 'optional' in the title of the Bill. The farmer or market gardener will draw sewage only when he requires it, and the company will be under no obligation to take the sewage except when they can dispose of it. The Act confirms a thirty years' agreement with the Metropolitan Board of Works, by which, in consideration of a half share in the profits of the concern (beyond 5 per cent.), the Board undertakes to supply the company with any quantity of sewage up to 60,000,000 gallons a day. The works proposed will be capable of supplying £20 worth of manure, at a charge of about £2, to every acre in the district during the six dryest months of the year. The company will divert the bulk of the sewage from the river, at any rate during the hottest months of the year.

THE FACTORY AND WORKSHOP ACT.

The Home Secretary, under the provisions of section 43 of the Factory and Workshop Act, 1878, has granted to workrooms in connection with drapers' retail establishments, and to workshops in which the curing of fish is carried on, a special exception 'that the period of employment for young persons and women, if so fixed by the occupier and specified in the notice, may, except on Saturday, begin at nine a.m. and end at 9 p.m., and in such case the period of employment for a child in a morning set is to begin at 9 a.m., and the period of employment for a child in the afternoon set is to end at 8 p.m.'

SANITARY INVENTIONS.

A NEW STREET AND YARD GULLY.

Mr. E. C. Buchanan Tudor, Engineer and Surveyor to the Goole Local Board and Rural Sanitary Authority, has invented a new street and yard gully and examination, etc., chamber, for drainage generally. The gully is a ventilator of itself, and so arranged that the drains are easily cleansed from the gully chamber by the action of a valve trap. The examination chambers are so arranged as to form junctions with subsidiary drains, and are also ventilators and easy of access. We understand specimens of these inventions will be sent to the Parkes Museum, where other articles of Mr. Tudor's invention are on view.

CHARTALINE BLANKETS.

The well-known properties of paper in preventing the too rapid radiation of heat have been utilised in the manufacture of these useful winter comforts. They are composed of a layer of wadding between two outer covers of paper, duly perforated for the purpose of ventilation. They are extremely light, warm, cleanly, and very cheap. It is claimed by the inventors, Messrs. Henry and Co., that one Chartaline blanket is equal in warmth to two ordinary wool blankets, and the result of trials tends to

confirm their assertion. Placed between the coverlet of the bed and the wool blanket, a Chartaline blanket prevents the too rapid radiation of heat, and by its lightness obviates the painful oppression caused by heaping on many blankets in cold weather. The low price and cleanliness of the Chartaline blankets render them especially valuable for the poorer classes of the community. They cannot become contaminated by the bodily emanations from the sleepers in the same way as do woollen blankets, nor can dirt so readily cling to the paper surface. In addition, the prices of the blankets are so low, that if, after a winter's use, they are thrown away, the loss will be infinitesimal. We cordially recommend a trial of these blankets, particularly for children, and for those classes where economy and cleanliness are of great moment.

THE LONDON AND PROVINCIAL STEAM LAUNDRY.

WE have inspected with much satisfaction the works of this new Laundry Company. The perfection of the economic arrangements for the reception, cleansing, and return of the linen must commend themselves to the attention of all housekeepers, to whom we should recommend a careful inspection of these points, so essential to the health and comfort of the household, and so often wanting in ordinary small laundries. The laundry is on a very large scale; the works, situate in the Battersea Park Road, being the largest of the kind ever yet opened. They cover a space of upwards of an acre and a-half of ground, afford employment to twenty male and 150 female operatives, of whom thirty-two are provided with lodgings on the premises, and are capable, when working up to their full power, of dealing with from eighty to ninety thousand 'pieces' of washing per week. The buildings are from the designs of Mr. Ernest Turner, of 246, Regent Street, and the whole of the machinery has been supplied and fitted by the eminent engineers, Messrs. Bradford & Co., of Manchester and London, by whom much of the machinery has been specially designed for this laundry.

The ventilation of the establishment has been most carefully looked to by Mr. Ernest Turner. The dormitories, of which there are two for the resident *employés*, containing twelve beds, each have vertical tube inlets and C. H. Sharp & Co.'s Crown Ejector. To each dormitory is attached a good bath-room fitted with porcelain bath, manufactured by Mr. John Finch, of Buckingham Street, Strand, the adjoining lobbies being fitted with Bostel's Excelsior closets. In all the living rooms, of which there are several for the officials of the Company, we noticed Boyle's outlet talc valves. In the outbuildings Macfarlane's latrines are provided for the use of the non-resident *employés*.

Perhaps the most important feature of the London and Provincial Steam Laundry, from our point of view, is the thorough provision made for the disinfection of linen and bedding sent from houses where contagious disease has been present. Vans lined throughout with zinc collect the linen, not in baskets, but in special wire-work crates, which are delivered direct into a special infected linen house by a separate entrance, and forthwith inserted bodily, without unpacking, into the disinfecting chamber, where they are subjected to dry heat. Even when thus effectively purified, however, they are not considered as free from quarantine, the whole process of washing, etc., being carried on in the same isolated house.

The sewerage of the building, an even more important feature if possible in an establishment of this description than in an ordinary building, is as perfect as Mr. Turner's well-known skill and experience in such matters can make it. Every drain throughout the works runs into a central channel effectively cut off from the common sewer, and thoroughly approachable for inspection and cleansing from end to end by the same simple but excellent method so successfully adopted by Mr. Turner at the Home Hospital in Fitzroy Square, and described in the SANITARY RECORD for July 1880. Finally, even the health of the equine inhabitants of the fine stables of the company is cared for by the adoption of Mr. B. Wilkinson's of Newcastle-on-Tyne, granite concrete paving, which ensures perfect surface drainage by the ingenious arrangement of the channels formed in the concrete.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, November 19th, at 7.30 p.m. The Council will present a Report on the following subjects:—1. The continuance of the payment for the collection of samples of the Metropolitan Water for analysis; and the publication of the results in the name of the Society. 2. The best and most convenient way of dealing with animal and vegetable trade refuse, (*e.g.*, from slaughter-houses, fishmongers', poulterers', and greengrocers' shops, etc.), with a view to its collection, removal, and ultimate disposal, whether by utilisation or destruction. 3. The selection of a Publisher of the Transactions of the Society. Mr. Lovett will make some remarks on a communication from the Charity Organisation Society on the subject of the Dwellings of the Poor. Dr. J. W. Tripe will read a paper on 'The action of Disinfectants on Sewage, and the Living Organisms contained therein', with illustrations. Dr. W. N. Thursfield will make some observations on the sanitary supervision of cow-sheds, dairies, and milk-shops, and will move the following resolution:—'That in the opinion of this Society it is desirable, having regard to the more effectual prevention of the spread of zymotic disease by the agency of milk, that the special sanitary supervision and inspection of cow-sheds, dairies, and milk shops, should form a part of the duties of the Medical Officers of Health and the Sanitary Inspectors of the respective districts.'

STATISTICAL SOCIETY.

The first ordinary Meeting of the present Session will be held on Tuesday, the 16th instant, at the Society's Rooms, King's College Entrance, Strand, W.C., London, when the President, James Caird, Esq., C.B., F.R.S., will deliver an 'Inaugural Address'. Dr. F. J. Mouat will also communicate a 'Note on the Tenth Census of the United States of America'. The Chair will be taken at 7.45 p.m.

The Wigton Local Board has decided to put in force the available compulsory powers for the acquisition of land for sewage-disposal beyond the district boundary. The execution of the sewerage scheme, which was prepared more than a year ago, is deferred until the land is acquired.

ORIGINAL PAPERS.

ON THE ACTION OF DISINFECTANTS ON SEWAGE, & THE LIVING ORGANISMS CONTAINED THEREIN.*

By JOHN W. TRIPE, M.D., M.R.C.P.ED.,
Medical Officer of Health and Public Analyst for Hackney.

As many of the experiments referred to in this paper were made with agents which do not belong to the class of disinfectants as defined in my brief notice of these compounds last session, I must be understood as using the term 'disinfectant' in the popular sense, that is to say, as an agent which removes smell or prevents putrefaction, but which does not necessarily act as a germicide. My chief reason for extending the enquiries to several agents of this kind is the small amount of precise information at present available to enable us to judge accurately what are the relative powers possessed by most of the popular disinfectants in removing smell from sewage, and destroying the various forms of life contained therein. I had also another and more important object in view, which, owing to the late period of the year at which the experiments were carried out, I have not been able to determine quite to my satisfaction, viz., the effect of chemical disinfectants on the various forms of bacteria found in sewage. This is a very important matter for enquiry, as the bacillus of sewage has a very close affinity to the bacillus of wool sorters' disease, and of ague. The micrococcus ureæ has the same microscopic appearance as the chain micrococcus figured by Koch as the cause of gangrene in the mouse. The small non-nucleated bacteria found in the urine are like the bacteria of fowl cholera, and those met with in the contents of water-closets during the prevalence of summer diarrhœa. I hope, however, another year to carry the investigations further, especially as my results differ considerably from those made by Dr. Crace Calvert on the bacteria and 'septic organisms' found in albuminous solutions.

The first set of experiments were made in the Spring of the present year, by adding 2 per cent. of the disinfectant employed to 4,000 grains of offensive sewage teeming with bacterioid and infusorial life. In the second set, which were not commenced until nearly the latter end of October, the same quantity was employed, but one drachm of fresh beef, finely shred, was put into each 4,000 grains of sewage, and taken out at the end of three days. In the third set, which was begun about three weeks since, unmixed sewage only was employed. The disinfectants used were those ordinarily sold, as by that means they could be more fairly compared than if I had taken the same weight or volume of the solid or other substances from which they were made. The second set of experiments were made by the addition, at first, of 1-400th part of the disinfectant, that is to say, of 10 water grains to 4,000 water grains of sewage, and when it was found that this amount did not remove the offensive smell, or destroy the living organisms, additional quantities of the disinfectant were added, until the proportion of 1 of disinfectant to 100 of sewage was reached, which is the strongest mixture likely to be found in drains or sewers when disinfected. To prevent mistake, I again mention that I used Condy's Fluid as sold, and have not tried the action of a given weight of permanganate of potash on the sewage. The same may be said of Burnett's Fluid, Chloralum, Chlorine, etc.

The microscopic forms found in the sewage, and especially in that containing the fresh beef, were several varieties of bacteria, including micrococcus crepusculum and ureæ, bacteria termo, free, and in the zoogloea form, bacteria linolea, and bacteria with highly refracting heads (points) and short tails. These two latter forms were comparatively very active. There were also several kinds of bacillus (ulnea and subtilis), vibrios, and several kinds of spirillum, which moved rapidly across the field of the microscope. All these are said to be plants, and associated with putrefactive action, especially some of the bacteria which evolve offensive gases, and render the fluid in which they exist so offensive as to destroy the infusoria. It is probable that they remove the whole of the oxygen from the fluid, and thus destroy the infusoria, as Sanitas and Condy's Fluid, which give off oxygen, when added in quantities which do not remove the whole of the organic matter from sewage, etc., enable the infusoria to grow larger, and reproduce more freely than they do in unmixed sewage.

One of the moot points in natural history is the nature of infusoria and bacteria. I need scarcely say I shall not enter into this. The infusoria detected were flagellata, some having one and some two tails, and others apparently without any; ciliata, some with and some without an oral fringe, and others having the upper lip prolonged into a proboscis; and numerous oval nucleated cells rapidly moving across the field of the microscope. There were also many unnucleated cells, either separate or joined together, which were probably spores of a fungus.

As *Heat* is probably the most reliable of all disinfecting agents, and as the temperature of a fluid can be most easily and accurately ascertained, and its effects on living organisms also definitely measured, I decided on experimenting with it, partly for comparison with the experiments made by various observers on bacteria, vaccine lymph, and septic microzymes. The plan adopted was as follows: a beaker was suspended in a water bath about one-third filled with water, another, of decidedly smaller size, was placed in it containing the sewage to be experimented on. A sensitive thermometer was next put into the sewage, which about half filled the beaker. The water bath was gently heated, and the sewage examined at every 5° Fahr. increase of temperature. The infusoria became more lively as the sewage warmed, but immediately the temperature exceeded 90° Fahr. their movements became slower, at 95° several ceased to move, at 100° a large number were motionless, at 105° more than half were dead, and at 110° all had died. This specimen of heated sewage was examined for each day for nearly a week afterwards, and no living infusoria were found. The bacteria were not affected until 115° Fahr. was reached, when vibrios became decidedly sluggish. At 120° F. many of the bacillus, vibrios, and spirilla were motionless, and at 125° all these had ceased to move, except a few spirilla. At 130° the smaller bacteria were very sluggish, except those with highly refracting heads, which were very active. At 135° the only moving bacteria were those just mentioned, and at 140° even they ceased to move. As these forms are very small, it is just possible that some may have escaped observation, but next day no living organisms could be found, although on the fourth day a very few of the smaller bacteria were

* Read before the Society of Medical Officers of Health, Nov. 1880.

again seen to be active, but no bacillus, vibrio, or spirillum. These results are so opposed to those reported by other observers that, although they were repeated three times with identical results, I propose repeating them at some future time.

The chemical disinfectants used were Carbolic Acid (No. 5), Burnett's Fluid, Chlorine Water (P.B.), Solution of Chlorinated Lime (P.B.), Euchlorine, Sporokton, Hydrochloric Acid, Chloralum, Sanitas, and Condy's Fluid. Sanitas and Carbolic Acid Powder were also experimented upon. The first seven were used in the first set of experiments, whilst chloralum, sanitas, and Condy's fluid were selected instead of chlorine and chlorinated lime solutions in the second and third set. The experiments were made at different times, but each set was carried out simultaneously, and are therefore strictly comparable. I mention this because infusoria are readily affected by temperature, etc.

Carbolic Acid (No. 5).—When this was mixed in the proportion of 2 per cent. nearly all the offensive smell was removed, and replaced by that of the acid, and all the living organisms were destroyed, although not more than half of the acid was dissolved in the sewage. There was no return of offensive smell, or of bacterioid or infusorial life, although the mixture was kept for twenty-one days. In the second set of experiments 10 parts of carbolic acid were added to 4,000 of a mixture of sewage and beef, when all the infusoria were destroyed in three minutes, and nearly all the offensive smell removed, that of carbolic acid being noted instead. The bacteria were not destroyed, and increased largely up to the fifth day, after which they diminished in number. As the temperature of the room was below 50° Fahr. for the greater part of the day, that may have partly caused the diminution. On the sixteenth day very few living organisms were met with, and fewer on the twenty-first day. The results of the experiments on unmixed sewage corresponded with those of the mixture of sewage and beef, except that the urinous smell was not so quickly removed. As carbolic acid is not very volatile, I thought it advisable to place a drop of sewage on a glass slide exposed to the vapour of the acid, taking care that none of the liquid should reach the sewage. After exposure for five minutes no alteration could be detected in the movements of the infusoria, but on placing the slide under the microscope, at the expiration of fifteen minutes, all the infusoria were found to be dead, but the bacteria were not affected.

Burnett's Fluid.—The results obtained with this disinfectant, when it was mixed with sewage in the proportion of 2 per cent., were the same as with carbolic acid, both as regards smell and effect on the contained organisms. On adding 10 water-grains of the fluid to 4,000 grains of the mixture of sewage and beef, the offensive smell was not so decidedly removed as with carbolic acid, although but little remained. The cessation of infusorial life was also not so decided, although nearly all the infusoria were killed, but the bacteria were not affected. When a mixture was made of 1 of Burnett's Fluid to 300 of sewage and beef liquor, the smell was removed, and the movements of the various forms of the baccillus, vibrios, and spirilla were sluggish, and ceased in a mixture of 1 in 200 of sewage.

Euchlorine, when added to sewage in the proportion of 2 per cent., removed the offensive smell and destroyed the infusoria; but no note was unfortunately made as to its effect on bacteria. In the second set of experiments with the sewage and beef solution, no appreciable effect was noted as regards the offensive smell, but a few of the infusoria were killed by the addition of 10 parts to 4,000 of the mixture. When the euchlorine was added, in the proportion of 10 parts in 3,000, the offensive smell was diminished, although the infusoria were not more affected than before. On the seventh day the smell became quite offensive, and the quantity of life was not lessened. More euchlorine was then added to make up the strength to 1 in 200, and with but little effect either on the smell or quantity of life, and none on the bacteria. On the sixteenth day but little change had occurred, except that the number of living organisms was much diminished. This however, could scarcely be attributed to the euchlorine, as there had been an equal diminution of life in the 4,000 grains of sewage and beef liquor, which had been kept as a check solution, without any disinfectant being added to it. The euchlorine used, was the admixture of Nos. 1 and 2, in the proportion stated on the labels of the bottles containing them. When a glass slide having on it a drop of the mixed sewage, was exposed to the gas evolved by the admixture of Nos. 1 and 2, the infusoria were destroyed in three minutes by the chlorine gas evolved. No life appeared in the solution containing 2 per cent. of euchlorine during the twenty-one days it was under observation, and a smell like apple remained to a greater or less extent during the whole period.

Sporokton.—This disinfectant, contains chloride of zinc, methylated spirit, and a considerable quantity of sulphurous acid gas, held in solution, I believe, under pressure, and therefore requires very considerable care in opening the bottle. When added in the proportion of 2 per cent., a strong smell of sulphurous acid replaced the offensive odour of the sewage, and the smell remained, although to a slight extent, on the 21st day, having become decidedly less on the eighth. No living organisms were detected at any time during this experiment, which lasted for twenty-one days. In the second experiment with sewage and beef, 10 water-grains, as with all other disinfectants, were added to 4,000 of the mixture, the offensive smell was but little altered, although a rather large number of the infusoria were destroyed. On the fifth day, more sporokton was added to make up the proportion to 1 in 300, and when the mixture was examined on the sixth day all the infusoria were dead, but the bacteria were as active as ever. The smell was offensive, but in a less degree than the mixture of euchlorine. When sporokton was added to sewage, in the proportion of 1 to 400 parts, but little difference was noticed in the smell, but when the quantity was doubled, the smell was comparatively slight, especially on the sixth day.

Solution of Chlorine (P.B.).—This was used in the first set of experiments only, that is to say, in the proportion of 2 per cent., when the results were by no means satisfactory. When first added, the smell of sewage was much diminished, and remained so for three days, but on the fourth day, the mixture became decidedly offensive, and the smell increased on the fourth and fifth days. When first added, it stopped all movement of the infusoria, but on the fifth day, when the offensive smell became so marked, numerous infusoria in a state of great activity were seen under the microscope, and they increased on the sixth, seventh, and eighth days, but became decidedly much reduced in number by the 10th day. On the sixteenth, they were fewer than before, and on the twenty-first had nearly disap-

peared, although the unpleasant smell still remained. The solution was alkaline during the whole of the experiment.

Solution of Chlorinated Lime (P.B.).—This acted at first more powerfully than the chlorine solution, all offensive smell having been removed until the sixth day from the mixture of 2 per cent. of solution and sewage. On the seventh day the mixture became slightly offensive. The unpleasant smell increased day by day, until it was stronger than the mixture of chlorine and sewage. On the sixteenth day the smell was more unpleasant than of the unmixed sewage, and remained so on the twenty-first, when the experiment was concluded. The addition of this solution to the sewage destroyed infusorial life, although the lifeless infusoria could still be seen, but on the tenth day living infusoria made their appearance, and were more abundant on the sixteenth and twenty-first days than in the unmixed sewage.

Chloralum, when added in the proportion of 10 to 4,000 of mixed sewage, produced, after a short time, a dense precipitate, but did not materially affect the smell of the mixture. On the second day there were fewer living organisms than in any other solution, except in those of carbolic acid, Burnett's Fluid, and hydrochloric acid. When added in the proportion of 1 to 300 of the mixture, no living organisms, except bacteria, were detected, but the smell remained unaltered, and even when 1 per cent. was added, the smell was by no means removed. The experiments with sewage alone were more satisfactory, but the offensive smell was by no means removed when 10 of chloralum were added to 400 parts of sewage. No infusoria were found in either solutions on the fourteenth day.

Condy's Fluid was not tried in the first set of experiments, but when added to the mixture of sewage and beef, in the proportions, at first of 10 in 4,000 then of 15 in 4,000, and next of 20 in 4,000, it completely failed to remove, or even to abate the smell, or destroy the infusoria. On the contrary, infusorial life became much more active, large-sized ciliata and and flagellata being observed on the fifth day. On this day, an additional amount of Condy's Fluid was added, so as to bring up the strength to 1 of Condy to 100 of the mixed sewage, when the red colour remained for more than a quarter of an hour, and the offensive smell was nearly removed. The infusoria were not so numerous on the fourth day after this additional quantity of Condy's Fluid had been added. The admixture of Condy's Fluid with unmixed sewage was more satisfactory, but even when added in the proportion of 1 in 100, a strong urinous smell existed. When much stronger solutions of Condy's Fluid were used, that is to say, 1 to 50, the offensive smell was removed, and the movements of the bacteria termo were stopped, and those of the infusoria much diminished, many being motionless. In a solution of 1 of Condy's Fluid to 33 of the mixed sewage, all movements both of infusoria and bacteria termo ceased.

Sanitas.—The addition of 10 of sanitas to 4,000 of sewage and beef, and then of 10 to 2,000, produced but little alteration in the offensive smell, and at the expiration of four days the unpleasant odour was unabated, and life was more abundant than in the unmixed sewage. When 1 per cent. of sanitas was added the offensive smell was much abated, but the living organisms were more abundant than even in the Condy's fluid solution of the same strength. On adding 1 to 100 of sewage the smell of sanitas was slightly noticeable, and the offensive smell was removed, except that a decidedly urinous odour was perceptible.

Sanitas Powder, when added to sewage in the proportion of 1 per cent., removed the offensive smell quickly, and destroyed the infusoria. There were no signs of infusorial life on the sixth day, when, unfortunately, the beakers containing this and the carbolic powder were upset. The powder was much more energetic in its action on sewage than sanitas fluid.

Carbolic Powder.—The effects on the smell of, and on the infusorial life contained in, sewage with this powder were the same as with sanitas, if the one experiment of each can be relied upon; but whether or not the offensive smell and life would have returned after the sixth day, as they did in mixture with chlorinated lime, cannot be stated, as there was no time to make a fresh experiment.

The results of these experiments may be briefly summed up as follows. The most powerful chemical agent used was impure carbolic acid, as when added in the proportion of 1 of No. 5 acid to 400 of sewage and beef liquor the offensive smell was nearly removed, and the odour of carbolic acid substituted for it; but although 1-400th part of acid destroyed infusorial life, it had no effect on the bacteria present, either in preventing their movements or propagation. Burnett's fluid acted with almost equal power on microscopic life, but did not succeed so well as regards the offensive smell. Hydrochloric acid scarcely diminished the offensive odour, but appeared to have equal power with the two other agents in preventing the appearance of infusorial life. Chlorinated lime in solution, whilst removing smell and destroying infusoria for several days, did not prevent the return of offensive smell on the sixth day, and appearance of life on the tenth day, whilst chlorine solution was not so powerful even as chlorinated lime. Chlorine gas, however, when newly given off and absorbed by the sewage, was more efficient when used as euchlorine than the standard solution of chlorine. Sporokton, which gives off sulphurous acid when the stopper is removed, was more powerful, bulk for bulk, than euchlorine, both in removing smell and destroying life. When the sewage was strong, 1-200th of euchlorine was insufficient to remove smell or to destroy infusoria, whilst this amount of sporokton was fatal to life, except bacteria, but was insufficient to remove all smell. Chloralum did not remove the offensive smell of sewage, but was fatal to infusoria when used in the proportion of 1 to 300 of sewage. Sanitas fluid and Condy's fluid did not exercise any adverse influence on microscopic life, but rather the contrary, until more of these fluids had been added than was sufficient to oxydise the organic matter contained in the disinfected fluid. When added decidedly in excess of this amount, Condy's fluid (1 in 50) interfered with microscopic life, and when used in the proportion of 1 in 33 the motions both of infusoria and bacteria ceased.

The results of the experiments by heat are important, as they proved that vibrios, baccillus, and some of the other bacteria of sewage, are killed by a temperature of 140 deg. Fahr., whilst former experiments have shown that vaccine lymph has been rendered sterile after being exposed for two hours to a temperature of 150 deg. Fahr., or for half an hour to a temperature of 170 deg. Fahr., but that until these temperatures were reached and maintained for the periods mentioned, the lymph still remained active. It is, therefore, probable that these bacteria, with,

perhaps, one exception, are more readily influenced by heat than the infective particles of vaccine. It must, however, be remembered that the fluid in which infective matter is contained modifies the action of heat and of many chemical disinfectants, which may, perhaps, account for the difference in the results obtained by myself and some other experimenters.

ON SANITARY CONVENIENCES FOR WOMEN.

By FRANCES ELIZABETH HOGGAN, M.D.

IN this age of sanitation, when the religion of health is preached far and near, it seems strange that the most indispensable of all sanitary appliances, which every vestry considers it its duty to provide (at any rate in part) for men, should be entirely overlooked in the case of women. Legislation of a permissive character has vested in Urban Authorities (1875) and in Local Boards of Health (1848) the power of providing and maintaining, in proper and convenient situations, water closets and other similar conveniences for public accommodation; and the earlier Health Act expressly states that words importing the masculine gender shall include females.

Several of the Medical Officers of Health of the metropolis have in their reports recognised this want, and urged on their respective vestries its due consideration. The Secretary of the Association of Medical Officers of Health, when a paper was offered to the Association on the subject in 1878, declared himself unable to imagine what any one could say 'to make the necessities of the case more clear than they are at present to all who have thought about it.' Sir James Hogg recently expressed himself as quite alive to the want, which he considers a real and serious one. Medical men have continually, one might almost say daily, brought home to them the sufferings, both physical and mental, which women endure for want of water-closet accommodation when away from their own homes, and, be it remembered, that many thousands of women are now engaged in work out of the house by which they earn their own living, and oftentimes support or help to support their families.*

Speaking from many years' personal experience as the medical adviser of women of all classes, I can affirm that there is no other sanitary appliance so urgently needed by women as water-closet accommodation.

Not long ago a venerable old lady, herself a ratepayer, wrote to me on the subject as follows:—'I venture to express a hope that you will treat the matter as a *right of female ratepayers*, one that has never been claimed, I daresay, but in present circumstances might be claimed fairly; and therefore I hope you will not begin with *the idea of charity*, but boldly claim the right, if that is possible. I did not think of this at first, but as a doctress I hope you may include all womankind in your benevolent scheme. It is a little startling as to "bienséance," but, *fiat justitia ruat cælum*, say I and some other good creature before me." Many other women both rich and poor, learned and illiterate, have spoken to me in the same sense, those who could wield the pen being held back from publicly advocating the right they felt belonged to their sex by the extremely delicate nature of the subject, and the dread of having to carry on a lengthened discussion on such a topic. We find, however, a lady on the staff of the *Queen*, writing in that paper five years ago as follows:—'That the need for such accommodation exists is a fact which is only too well known in every woman's personal experience . . . . That there is a great want of such accommodation is evident. . . . . It is not a matter in which the initiative is easy to take; but once initiated the value will easily be seen, and the usefulness extensively appreciated.'

Some points which appear to have been overlooked by the public, call for consideration here. One is that the childbearing function of women renders them liable to accidents, which, when they are threatened with them in the streets, are peculiarly painful to the feelings of modest women, who endure much mental agony, as well as frequently great physical inconvenience and pain, for want of precisely the accommodation which would be afforded them by accessible water closets under the supervision of some kindly, helpful woman.

Another point worthy of attention is that it is neither seemly nor decent that women out with babies and young children should have no place but the streets or parks in which to attend to the frequent physical needs of their young charges; and it is in the highest degree objectionable that children of both sexes should contract the habit of satisfying the calls of nature openly in places of public resort—a habit which must of necessity tend to blunt those feelings of modesty and reserve which it should be the aim of all civilised societies to promote and foster.

It can hardly be necessary to insist further on the necessity for the water-closet accommodation now demanded for women. It may not, however, be inopportune to call attention to the fact that in London poor women are really worse off than formerly in some respects. The distances to be traversed and the number of women compelled to work away from home increase from year to year, and moreover the old-fashioned parochial or independent elementary schools were hospitable towards distressed women, whereas their successors, the board schools, are under a more rigid rule. The waiting-rooms of railway stations are, it is true, resorted to, but these are mostly available for paying applicants only, and they are absent from the neighbourhood of many of the most crowded thoroughfares.

Last year the Prefecture of Paris entered into a contract with a company, which latter was to supply a certain number of *châlets de necessité* (in the first instance 100), to supplement the insufficient accommodation already existing. The châlets were to be of two kinds; some for both sexes with separate entrances at opposite extremities of the building, and others for women and children only. The defect in the scheme (and a serious one it is) is that the tariff is high, fifteen centimes per person, and it would appear that there are to be no free admissions. But such as it is, the tariff is imposed on individuals of both sexes.

The experience of Berlin is especially interesting. I will give it in the words of Frau Schepeler-Lette, the indefatigable supporter of her sex's rights in this particular, as I was frequently told by her grateful country-women: "In the press of much business I have only to-day been able to give you information about the public water-closets for women. They are now pretty generally spread over the whole town, and are divided into those which are attached to public girls' schools, those contained in the Town-hall, etc.,

* No fewer than 143,341 women were engaged in London in sixteen of the principal trades, according to the census of 1871. These figures are, however, far from representing the number of women whose work necessitates long walks through the streets of London.

which are kept in order by the porter and the women of his family, and for the use of which a half-penny or a penny is charged, and those which are to be found in open squares, or in the more secluded parts of public gardens. The latter kind have been farmed out by the magistrature for a certain number of years at a fixed sum. They are placed under the care of female attendants, who are paid forty-five shillings a month as fixed wages, besides the gratuities received from well-to-do ladies, which amount to a respectable little income. These places are remarkable for their cleanliness and for a certain air of comfort. My journey to America at the time of the exhibition was the principal cause of the increased accommodation, for in America such conveniences have existed for many years, and on my return I did not cease to petition the Berlin Magistrature until I obtained my end. Their usefulness is obvious.'

It would be curious, but perhaps idle, to enumerate the schemes set on foot at various times in this country for the purpose of supplying women with necessary water-closet accommodation, from the omnibus or caravan which used at one time slowly to be driven through some of the principal London streets, to the Lavatories Company, and the more recently established Châlet Company Limited, on the plan of the above-named Paris Company. All but the Châlet Company have collapsed ; but it appears that several of the northern towns and one metropolitan vestry* have adopted the Châlet system, while others are now in treaty with the company concerning its adoption. The present may therefore be considered an opportune moment for urging on vestries the duty of providing a certain amount of water-closet accommodation free of charge. The châlets, with their proposed one penny admission fee, will doubtless be a great boon ; but it ought not to be forgotten that those who most feel the want, that is to say poor women going backwards and forwards to their work, will also be least able to pay, and will find even the proposed penny a heavy tax on their slender resources. London ratepayers (including large numbers of women) are somewhat heavily taxed for the provision of urinals for men, and women have therefore a fair and just claim on the vestries for some free accommodation of the kind, in addition to the paying accommodation which the Châlet Company undertakes to provide. The mode of its provision will doubtless vary in different localities, and the difficulty of procuring sites—a standing objection with vestries—would not be insuperable if once the principle were conceded. The public baths and wash-houses, being under the direct control of the vestries, might easily have free public water-closets attached to them, those for women and children being under the superintendence of a female attendant. Girls' and infant schools might by arrangement be sometimes induced to provide closets for women, as in Berlin. I once threw out the suggestion that in some districts the managers of coffee taverns might be willing to provide the necessary accommodation at a moderate cost to the vestry, in consideration of the increased custom which would probably flow in to them in consequence of so doing.

One thing is clear. Female ratepayers will be wronged if the vestries in London and the various local boards out of it, contract with the Châlet Company Limited, for the supply of the water-closet accommodation which they have till now neglected to provide themselves, without inserting in the contract a clause requiring a certain number of free places in each châlet, with a separate entrance it may be, but under the care of the female attendant in every instance. Much has been said by vestrymen, as a reason for not conceding the claims of women and children, about the expense attending the necessity of always putting a woman in charge; but one never hears of any objection being taken to the necessary male attendance for flushing urinals, etc., although the outlay occasioned by the latter is often considerable. Granted that the wages of a separate female attendant for every group of water-closets would be an important item, the difficulty might be met either by placing near every group of free closets for women another group of paying closets under the same attendant, as a means of recouping a part of the money expended on her wages, or else by allowing, but not requiring, a small gratuity to be given by those using the closets, which would greatly reduce the fixed weekly or monthly wages it would be necessary to give. In short, difficulties would vanish if resolutely faced ; and to ensure justice to women in this matter little more is needed than the recognition by the proper authorities (the vestries in the case of London) of their obligations, and the determination no longer to shirk them. So long as these obligations are not recognised and fulfilled, so long will England, with all its hygenic congresses and sanitary reformers continue to hold a position of disgraceful inferiority, when compared with other countries, in regard to this most important sanitary question.

* The towns of Leeds, Birmingham, York, Stoke, Northampton, Nottingham, Derby, and Gateshead, and the vestry of Fulham, have adopted the Châlet system.

NOTES ON INDUSTRIAL DWELLINGS.

By Elijah Hoole.

VIII.—DRAINAGE.

No part of the arrangement of dwellings of this class are more liable to misuse than those connected with the drainage, and none are more prejudicial to the health and comfort of the tenants when out of order.

Drains to buildings of this kind do not differ in any material respect from those generally required for dwelling houses, except in needing the utmost perfection both of arrangement and construction. They are particularly liable to derangement from obstructions caused by the carelessness of tenants, who throw down the drains solid refuse for which the dust-bin is the proper receptacle. It therefore becomes necessary to discard the use of bend-pipes and junction-pipes, and to substitute small brick man-holes, which, being brought up to the surface, permit every turn in the drain and every connection of one pipe with another to be readily inspected and cleansed. The pipes must be laid in perfectly straight lines from man-hole to man-hole, and with unvarying fall. If necessary, rods can then be passed from one man-hole to another, and any obstruction may be readily removed. As a matter of experience, however, it is found that obstructions, when they do occur, happen at the bends and junctions, and not in the straight lengths of pipe, if properly laid. Drains laid as just described may be counted on for freedom from stoppage if fairly used.

In laying the pipes it is absolutely necessary, not merely that straight lines and regular fall should be preserved, but that the joints occurring at distances

of two feet should be absolutely air-tight and water-tight. Portland cement is the most available material for making tight joints, and when properly used answers its purpose perfectly; but it is by no means easy to get the workmen to fill the socket so thoroughly as to make the joint tight—indeed, to effect this a special tool is required, the ordinary trowel being quite inefficient for this purpose. No line of pipes should ever be covered up without being tested and the tightness of its joints ascertained. The ordinary practice of assuming the tightness of joints without testing cannot be too severely condemned. Man-holes afford the opportunity of testing each length separately. The lower end being effectually plugged with clay, or otherwise well stopped, the entire line of pipes should be filled with water and the height at which it stands observed. Each joint may then be examined separately, and if all prove sound, and if on a second inspection the level of the water remains unaltered, the work is satisfactory. It often happens, however, that one or two defective joints will occur in a length of drain otherwise well laid, and when this happens they must be cut out, re-jointed, and tested again, until a perfect result is obtained. As a security against fraud on the part of the workmen, the tester should either see the pipes filled with water himself, or at any rate should see the plug withdrawn after testing, and notice both the quantity of water released and observe whether the level of the water at the upper end is instantly depressed when the water begins to flow. A plug near the upper end may sometimes be introduced by fraudulent workmen, to retain the water and to simulate a soundness really absent. The importance of absolute tightness in the joints cannot be over-rated, since without it the liquid, which possesses the carrying power, escapes, and leaves a constantly accumulating solid obstruction behind, while the escaped sewage is most pernicious in its effects upon the soil and upon the air in its neighbourhood. Tight joints are thus essential, both for mechanical and sanitary reasons.

The best form of man-hole is that of an elongated rectangle on plan, having the greatest length in the direction of the drain. The bottom should be formed to the shape and fall of the drain-pipe, and should then be sloped back to the sides of the man-hole, so as to afford no ledge on which any sediment can rest. In the case of man-holes serving as bends or junctions, the channel in the bottom should take an easy curve. Portland cement concrete is a good material for forming these channels, or they may be formed of brickwork in cement, and in any case should be rendered to a smooth surface, and the cement allowed to set perfectly before any water runs over it. In the last man-hole through which the sewage passes on its way to the outfall, a syphon trap should be inserted, to prevent the sewer gas of the main drain coming beyond this point. This trap may be of somewhat smaller diameter than the drain itself, and should be accessible at both ends from the man-hole.

In planning drains it should always be borne in mind that the pipes not merely conduct water to the outlet, but that they also conduct air impregnated with the gases evolved from sewage. This contained air will escape wherever the sewage enters the drain, unless other outlets are provided for it. It is because this fact is overlooked in draining houses, that so many ill effects are produced by the escape of foul air into them. To be absolutely free from danger a drain must be ventilated throughout its entire length, or rather must be allowed to ventilate itself, since the natural tendency of air to circulate, and to dilute the gases formed in the drains, will be quite sufficient to ventilate them, without any artificial aid. It is only necessary to provide an inlet and an outlet of sufficient diameter, a single opening being insufficient. Wherever practicable, grated openings at the ground level are the best drain ventilators, but where space is restricted, and where the gratings cannot be kept at sufficient distances from windows and doors, pipes may be carried up to serve the same purpose. These are, however, somewhat less efficient in action, owing to the friction which takes place in the passage of air through them. Pipe ventilators must therefore be of ample diameter; the one- or two-inch pipes in vogue a few years ago are quite useless as ventilators, though sufficient to relieve pressure. A four-inch pipe is the smallest that should ever be used as a ventilator, and the diameter may be increased with advantage, especially where the length is considerable. Ventilating pipes should be carried up to the ridge of the roof if possible, and, in any case, should terminate either well below the level of the chimneys, or should be carried to a considerable height above them. If terminating at the same level, though at a distance, the air discharged from the ventilating-pipe is always apt to be blown over, and to pass down some chimney. No cowl is needed. When the air is still, a cowl produces no effect, when there is a breeze it is not needed, as ample circulation takes place without it. A guard of galvanised or copper wire, to protect the mouth of the pipe, is preferable to a cowl. One ventilating-pipe should leave the drain as near the outlet as possible, and the other, where there are only two, should be close to the upper end. In long lengths of drain intermediate ventilating-pipes may be introduced with advantage, and all should be so carried up that when they serve as outlets the foul air may be safely discharged. They will be either inlets or outlets, according to the direction of the wind.

The w.c. arrangements cannot be too simple; elaborate appliances soon become deranged, or break down with the rough usage. Doulton's basin, with an iron trap made by Stevens of Glasgow, is found to answer better than any apparatus having movable parts. A stoneware trap is not sufficiently strong to withstand the rough treatment to which the trap is subjected, whenever a slight obstruction occurs. A capped opening should be formed in the trap, so that both ends of it may be accessible without disturbing the joints of the pipes, and the seat and riser should be fixed with screws, to give ready access to the trap. For flushing, the water waste-preventer made by Messrs. Dennis of Chelmsford, is both efficient and economical. With one pull of the chain the whole contents are discharged through a syphon, the bend of which rises above the level of the cistern, and thus prevents any waste by overflow. The slight noise made by the working of this waste-preventer is of no consequence in buildings of the class now treated of, where the closets should always be completely isolated from the living rooms. A cement floor formed beneath the closet, and slightly inclined to an outlet, will serve as a safe to take any overflow or leakage when derangement occurs. Cast iron is the best material for the soil-pipe, and four inches is sufficient diameter. There is hardly any limit to the number of closets which may be connected to a single four-inch vertical soil-pipe, provided that there are not too many on the same floor. Great care must be taken that every part of the soil-pipe is accessible by

capped openings, and that all bends and junctions have easy curves. It is also a good plan to carry the iron pipe direct into a man-hole, and allow it to discharge there rather than to attempt a junction with a stoneware pipe at the foot of the vertical soil-pipe. The difference of diameter and thickness in the iron and stoneware make a perfectly tight joint impossible, as anyone may prove by plugging the drain, and filling the soil-pipe up to the top with water. The iron pipe, if properly jointed, will always stand this test. If at some distance from doors and windows, the foot of the soil-pipe may discharge over a stoneware trap, in the open air. This plan has the advantage of allowing the bottom of the soil-pipe to be completely open. Rain-water pipes should always discharge in this way, and should never be connected to the drain, or be made to serve as ventilating-pipes.

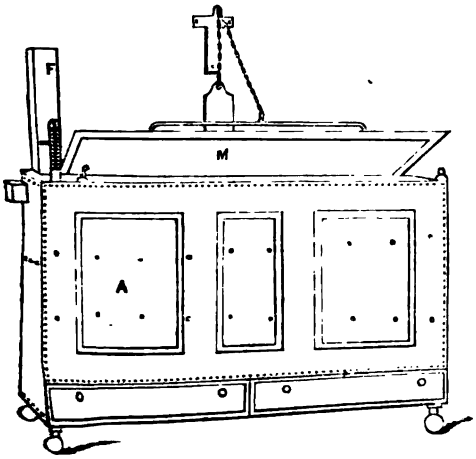
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

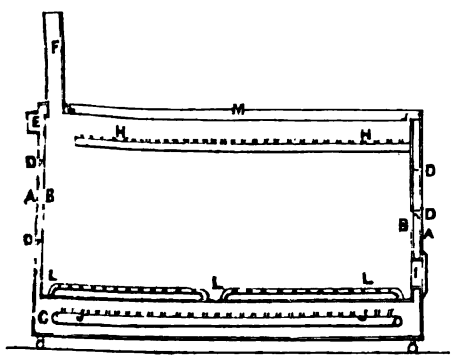
(*Continued from p.* 159.)

AIR.—XXXVI.

Disinfection by Hot Air (continued).—A disinfecting apparatus in use in many of the London and Provincial workhouses and hospitals, which takes



Elevation.



Longitudinal Section.

Nelson's Disinfecting Apparatus.

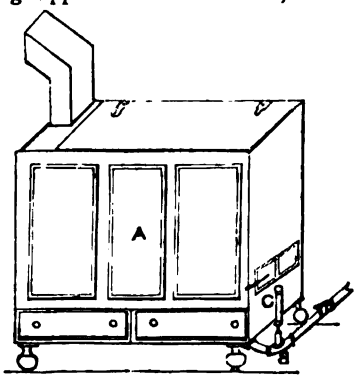
A, outer box; B, inner box; C, space between inner and outer casing; D, angle irons; E, outlet for the products of combustion from gas jets; F, outlet from interior casing for effluvia; H, thermometer; I, cold air admission valve; L, grids supporting the articles to be disinfected; M, lid, with balance weight and pulley; J, gas jets.

the common form of a chest, rectangular in shape, and made of wrought iron, is that known as Nelson's, and manufactured in Leeds.

Across the top of the box are ranged a series of iron bars, upon which rest the clothes to be disinfected. When flocks, feathers, bedding, or small articles are to be disinfected, perforated iron trays or shelves resting on the framework are used to hold them. Underneath the plate which forms the bottom of the box are arranged means of producing dry heat expeditiously, consisting of a series of gas jets running from end to end of the chest. These jets are enclosed, with the exception of the underneath part (where air is admitted for the combustion of the gas), and the heat so generated is caused to pass between the inner and outer casing of the chest. Angle irons or partitions placed at intervals within such casing, and running round the sides of the chest and at each end alternately, prevent the direct ascent of the hot air, and cause it to traverse from end to end until it reaches the top, where it escapes into a flue. By this arrangement the whole box is equally and thoroughly heated, and the articles quickly disinfected. The lid forming the top of the box is opened by means of a chain and weight passed over a friction pulley. A cold air valve is also introduced into the chest for the purpose of clearing it of noxious vapours, and these are carried by means of a flue valve into the flue.

The minimum temperature found necessary for disinfecting clothing, or for the destruction of vermin, nits, or disease germs, is 200 deg. in this apparatus, which temperature would be below the number of degrees necessary to destroy ordinary textures. The articles to be disinfected are spread open on the iron rails, the lid is closed, the gas is then ignited, and in twenty minutes' time the thermometer will show a temperature of about 140 deg. outside, which would be equal to 200 deg. inside. The gas is then turned off, the cold air valve and flue valve opened, whereupon the interior foul air will be driven out, and the clothes removable without annoyance. When the apparatus is once warm, the operation of disinfection need not last more than ten minutes. Where gas is not available, the same kind of apparatus can be arranged so as to disinfect by the dry heat derivable from a charçoal fire.

Messrs. Nelson & Somers have just invented a disinfecting apparatus of this kind, in which the



Nelson & Somers' Self-acting Disinfecting Apparatus.

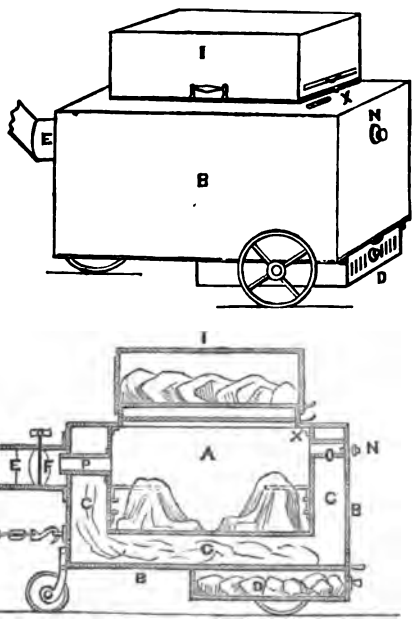
A, body of apparatus; B, valve in gas-pipe on the way to the burners; C, metal tube extending into the exterior and containing mercury.

articles to be treated can be left unattended for any length of time without the possibility of the 200 deg. Fahr. being exceeded. This desirable arrangement

is effected by means of an expansive fluid or metal rods acting upon the valve admitting the gas, or upon dampers when charcoal is made use of.

In this case a metal tube containing mercury is placed in such a position within the disinfecting chamber as to be sensible to the heat within, and so arranged, with the intervention of mechanical appliances, that on a certain heat being attained within the chamber the expansion of the fluid shall actuate the levers and other instruments in such a way as to shut off the gas supplying heat to the chamber, or when fired with charcoal or other fuel, shall operate upon the heat by means of dampers.

I will now give an example of a portable apparatus where ordinary fuel can be used, invented by Dr. Rogers, of East Retford; and in this case the articles to be disinfected are shut up in a wooden box in the sick room, and need not be touched again until thoroughly disinfected.



Rogers' Portable Disinfecting Apparatus.

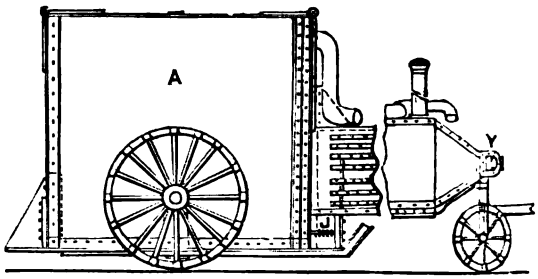
A, chest, with iron outer casing, B; C, heating flue; D, removable fire-box; E, flue, with valve, F; I, box brought from sick room with articles to be disinfected; X, thermometer; D and P, air inlet and outlet for the removal of steam and foul air; N, valve for inlet of air.

This apparatus consists of an iron chest, surrounded by an outer casing on the four sides and under the bottom, which forms a heating flue, and is connected with a fire-box at one end and with a flue with a shut off valve at the other. The open top of the chest is closed by a slide, and the whole is mounted on wheels, so that it can be readily moved from one place to another.

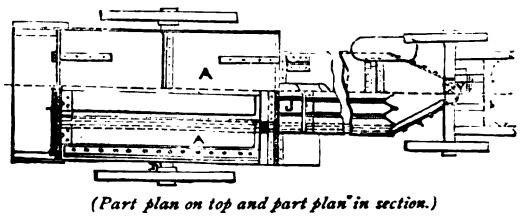
A wooden box closed by a sliding lid is provided for the reception of the clothing to be disinfected. The sides of the box on its being turned over fit tightly over the opening of the hot chest; and on the withdrawal of the two slides the clothes drop through the openings into the hot chest upon racks, and the chest slide being closed the heat is raised to the required degree, which is indicated by a thermometer in connection with the interior of the chest.

Over the fire-box is a small valve opening from the outside for the admission of air to the interior of the chest (but not communicating with the heating flue), and an opening is also made through the opposite side in connection with the flue exit, the object of this arrangement being to allow a current of air to be passed through, to carry off any steam arising from dampness in the clothing.

Fabrics can be disinfected, deodorised or bleached on a very large scale by discharging heated currents of air through them, and an apparatus of this kind was devised last year by Messrs. Stobbs and Seagrave, of London. The same system is, moreover, applicable for use on a small scale, and can be made portable.



Elevation.



(Part plan on top and part plan in section.)

Stobbs & Seagrave's Apparatus for Disinfection, etc.

A, body of apparatus; J, furnace with water vessels space above; V, blower.

Messrs. Stobbs and Seagrave use a super-heater for super-heating steam or atmospheric air, consisting of a metal box having divisions loaded with refractory material, and arranged so that the steam or air is compelled to take a zigzag course, and is effectually broken up and heated on its passage through the super-heater. For this purpose they take either live steam from a boiler or exhaust-steam from the exhaust-pipe of an engine, or atmospheric air from a blower, and by the super-heater they can heat the steam or air thus derived to the required temperature.

In order that the heat from the super-heated steam or air thus obtained may be imparted to the currents of air, they construct a trunk shaft or flue, and in this trunk they either place longitudinal parallel plates or tubes of an heat-conducting material. The super-heated steam or air passes between the plates, and the cold air from the blower thus derives a quantity of heat therefrom. On the top of the trunk a chamber is constructed for receiving the heated air, and above is an air distributor, overhead of which is the room in which the articles to be operated upon are placed.

In the portable apparatus, a vessel provided with hollow partitions is fixed above the furnace, and through the chambers of these partitions air and fire heat are allowed to pass, and as steam is generated the higher parts of the boxes become filled with steam, which the passing currents of air condense into water, the latter flowing down to the lower part to be again converted into steam under vacuum.

Negotiations for sewage-disposal land are being carried on by the authorities at Appleby (Westmoreland), on the basis of scheme prepared by Mr. George Watson, of Penrith.

DWELLINGS OF THE POOR AT EXETER.

BY OUR SPECIAL COMMISSIONER.

A WRITER in the *Times* recently said, 'that of all the autumn congresses, there is none which might be expected to excite more general interest than the sanitary meeting in the city of Exeter. Rarely, if ever, have the sectional meetings of a congress been better attended by all classes. The Mayor of Exeter asked for all the practical help and criticism that experience could suggest. Speaking at the Victoria Hall, he expressed a hope that some gentlemen would go round the city and examine the water-works, sewage, and other arrangements, and if they did not actually report upon them, he hoped that, at least, they would not depart without leaving behind them some practical result of their labours. I have ventured to adopt the Mayor's suggestion, and I hope that the following statements may tend to promote the sanitary reforms which the Mayor and many of his fellow-citizens so earnestly desire.

As the Commissioner of the SANITARY RECORD, I have visited very many of the dwellings of the poor in various parts of this country and in Ireland. I, therefore, thought it might prove of advantage if I inspected the poorer districts of the city of Exeter. Accompanied by a local member of the medical profession, I visited Ewen's Lane, Ware's Buildings, Commercial Road, Smythen Street, Preston Street, Stepcote Hill, and other places in the west district.

The houses at Exeter inhabited by the poorer classes are situated on the banks of small streams locally known as Mill Leats. All the drainage from the houses passes into the leats, the smell from which can be better imagined than described, especially when it is stated that the water is often at a low level, and that deposits from the drains necessarily result. Briefly, the best description possible of these leats, to those who are familiar with Dublin, is to call them what they really are, small Liffeys. The houses are all, or nearly all, ancient erections in a state of disrepair. One house, 4, Ewen's Lane, will give an idea of the worst of them. It is occupied by two families, who pay from 2s. to 3s. 6d. a week for the rooms they inhabit. On the ground floor only the front room is occupied, those at the back being retained by the landlord to house ducks, fowls, and other lively inmates. An unpaved passage leads to the leat at the back. Here are situated the conveniences, which overhang the leat, and which are of a more primitive description than those usually met with at volunteer encampments. There is no water supply. The inmates have to fetch all they require from a well in a neighbouring yard. The truth is, excepting the additional cleanliness which one finds in most English dwellings, however humble, there is little difference between Ewen's Lane and much of the tenement property in Dublin. Ewen's Lane itself is narrow, and is traversed from end to end by an open gutter some twelve inches wide. The results to the inhabitants of such surroundings were apparent, for at two houses visited a child was convalescing from typhoid fever. I am informed that one of the medical officers at the Exeter Dispensary has had under his care during the last twelve months no less than twenty of such cases, all of which he attributes to the insanitary conditions under which these poor people are at present compelled to live. In an able paper on the Exeter Sanatorium (see SANITARY RECORD for Oct. 15, 1880, p. 125), by Mr. Woodman, F.R.C.S., one of the Medical Officers of Health for the city, the necessity of a compulsory notification of each case of fever was insisted upon. This is certainly most desirable; but the first step, in my opinion, which the city authorities ought to take to secure the health and proper sanitary condition of Exeter, is to at once obtain the services of an experienced Medical Officer of Health, whose whole time must be devoted to the duties of such an office. On this point, the speech of Dr. Carpenter, of Croydon, at one of the sections, ought to command attention. The appointment of this officer seems to me to involve the whole of the sanitary reforms which the Mayor and the local press are so anxious to see carried out. As Dr. Carpenter said, 'It is absurd to appoint a Medical Officer of Health to take charge of a large district at a salary of £25 a year. It was, in fact, paying him not to do his work.' It appears from Churchill's Directory that the population of Exeter is 35,000, with an acreage of 1,800. There are four Medical Officers of Health, who receive '£26 5s. per annum between them for periodical reports; fees for all other services'. In 1866, the year of the cholera epidemic, an Exeter practitioner told me 'the inhabitants of Preston Street died like sheep', and that the present condition of this street is now rather worse than better than it was then. If one Medical Officer of Health were appointed at an adequate salary, his constant attention would be devoted to remedying these sanitary evils, and his reports would strengthen the hands of the authorities by awakening the inhabitants to the dangers with which such localities threaten the city. In this way the sewage arrangements, the water supply, and the dwellings of the poor in Exeter would speedily be improved. Without the aid of such an officer, I fear the interest excited by the presence of the Sanitary Congress in matters affecting the public health will pass away as rapidly as the enthusiasm which it has called forth.

I wish that the Mayor and the leading authorities of the city would spend a couple of days in making a careful inspection of the localities to which I have referred. Failing this, I hope the local press will give an exact description of some of the worst parts of this insanitary neighbourhood, where, it must be remembered, very many of the poor inhabitants of the ancient city of Exeter have to spend the greater part of their natural lives.

SANITARY APPOINTMENTS.—Mr. Joseph Gordon, C.E., has been appointed Surveyor to the Corporation and Urban Sanitary Authority of Leicester, at £700 per annum, offices, stationery, etc., *vice* Stephens, deceased; Charles Green, M.B. Univ. Durh., M.R.C.S.Eng., L.S.A.Lond., has been appointed Medical Officer of Health for the Gateshead Urban Sanitary District, at £120 per annum; Edwin William Barton, L.R.C.P.Lond., M.R.C.S.Eng., has been appointed Medical Officer of Health for the Market Rasen Urban Sanitary District, Lincolnshire, at £10 10s. for one year; Mr. J. Douglas Johnstone has been appointed Clerk to the Tavistock Guardians and Rural Sanitary Authority, at £80 per annum as Clerk to the Guardians, and such amounts as shall from time to time be allowed as clerk to the Rural Sanitary Authority, to the Assessment Committee, and the School Attendance Committee, also Superintendent Registrar of the Tavistock district, and Clerk to the Whitchurch School Board and Tavistock Highway Board, all *vice* Mr. Robert Luxton, deceased.

THE
SANITARY RECORD.
DECEMBER 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

FOGS AND SMOKE.

AT the right moment, and after a prevalence of wet weather, which has intensified the production of mists and fogs—especially over insufficiently drained districts, and sites upon which houses, and even whole parishes have been erected, without due regard to sub-drainage—the metropolis has risen up, almost as one man, to ascertain whether or not the hitherto ever-present nuisance of, at least, smoke-laden fog can be mitigated. With praiseworthy energy, the Kyrle and National Health Societies have put their hands to the plough, and judged by the amount of energy hitherto exhibited, the names of those who form the Committee, and the warm reception accorded to the movement by the manufacturing industries, the solution of the problem of how to redress the evil is not far distant.

The poor 'we shall always have with us', and likewise we must always expect to encounter the fogs caused by the condensation of the vapour drawn from the earth by heat. In the winter months especially, we may be supposed to continuously endure the ordinary fogs of nature, because they cannot be formed in high regions when the thermometer near us reads below 32° Fahr., and because water, having a greater capacity to retain heat than the land, the latter becoming more readily warm, is induced, in winter, to give out a greater amount of vapour, which is condensed into fog or mist the moment it encounters the action of the cold air. This is immaterial in country places, or relatively so, but when this unavoidable, or almost unavoidable, factor is loaded with carbonic acid, sulphurous acid, and other compounds held in suspension, the result is our dense yellow and black fogs, which have before now destroyed our exhibition cattle by the score, and played otherwise irrevocable havoc. To this may be added the minor nuisances of infected membranes, sore eyes, and the like, due to the presence of unconsumed carbon.

We will not anticipate the reports of the Committee of Experts, who are now considering the question from every available point of view, and who trust, by the means of anthracite and smokeless coals, by the increased consumption of gas in cooking and heating, and by the use of improved ordinary smoke-consuming appliances in the house and factory, to reduce the evil so much complained of, because it would be in a manner useless. We simply invite our readers to study for themselves the whole question, and to say whether or not the dense and offensive fogs in London, Birmingham, Manchester, Leeds, and other large towns which they may inhabit, may be commensurately relieved from the carbon nuisance. It is also a matter of great relevancy whether or not the Smoke Prevention Acts, passed in the reign of our gracious Queen, should not be more earnestly enforced in the country as well as in the town.

It has been proposed by one of our staff, that the Government be petitioned to offer a premium—open for say two years—for the best system of ridding smoke of sulphurous acid, which is its chief deleterious compound. But at all events, seeing that the opacity of fogs in towns and cities is mainly due to unconsumed carbon, it may be desirable to petition that the existing Acts be extended so as to make them applicable to private dwellings not yet erected, rendering it, in fact, compulsory for every one building a new house to adopt smoke-consuming grates, ranges, or furnaces, so as to satisfy the local authorities, who shall be empowered to test the smoke outlets by some efficient means, such as, for instance, the collection and weighing of the wasted carbon when fresh fuel is applied. And with regard to existing houses, the Government might, perhaps, be wisely petitioned whether they would not render it obligatory upon the owners of house properties—within a given time after the expiration of every existing lease—to insert at the base of all flues an apparatus fulfilling the required conditions. In such cases it might be suggested—inasmuch as it would prove a benefit to the community—that the Government be recommended to consider the advisability of remitting, in the last-named conditions, a portion of the taxes payable in respect of such dwellings, by way of compensation to the house-owners. In any case, whatever measures of improvement may be taken, it is now full time that we are rid of the demon Smoke, so far as we can exorcise him by science and legislation.

THE CONDITION OF GREENWICH.

THERE is probably no sanitary district in the United Kingdom where the health of the people is less cared for, than that for which the Greenwich District Board of Works is responsible. The streets and thoroughfares of this suburb of London, are, many of them, in such a condition, that ladies can hardly ever walk along them without a shudder; every dead wall, and almost every railing and stone pillar, is utilised as a common convenience. To give one instance out of many, we may point out King Street, popularly known as 'Tea Row'. This street is the direct thoroughfare between the pier and the park, the Royal Naval College, and the church of St. Mary, where an aristocratic congregation is wont to assemble on Sundays. It is a fact that very often one side of this street is almost impassable to decent people on Sunday mornings, owing to the disgusting state of filth to which the wall and pathway on the Royal Hospital School side have been re-

duced. This wall constitutes a nuisance, which must make its presence felt in the wards of the School Infirmary, and we wonder that the Government tolerate it. There are, for all practical purposes, no public conveniences in the district, and the careless disregard of the authorities for public decency is well shown in the case of King Street, where the nuisance might be at once abated by the erection of an additional lamp, and of a urinal, which latter might be placed out of sight and above the railway. There is certainly one public urinal in Greenwich. It is placed inside the churchyard, and the walls of the parish church form two of its sides. The new vicar, the Rev. Brooke Lambert, is not likely long to tolerate such a neighbour. The condition of King Street is but a specimen of that of many of the thoroughfares where the more respectable inhabitants reside. All of the inhabitants are disgusted, but all say it is useless to try to remove abuses which have been so long patiently endured. The coroner recently gave a graphic description of the abominable condition of the Greenwich mortuary. We have on more than one occasion called attention to the scandalous state of very many of the tenement houses, and the occupants of the Bowater estate, known as the Blackheath Fever Nest, have recently been subject to a severe outbreak of scarlet fever. Upwards of eighty cases have been reported, and there have been ten deaths in a population occupying some 200 houses only. These poor people are gardeners and laundresses chiefly; the houses are situated in juxtaposition to some of the best residences in Blackheath, and now that the fever has come, as our commissioner foresaw three years ago it would come, a panic has occurred. Dr. Carpenter, of Croydon, has been requested by the inhabitants to inspect this locality, and to make an exhaustive report. We shall therefore refrain from comment until this report is published. Meanwhile, the inhabitants of this unfortunate district, as well as everyone who is interested in the health of the poorer populations of our crowded cities, must be impressed with the necessity for an exhaustive enquiry into its sanitary condition by the Local Government Board.

Mr. Snell, a member of the Vestry of St. Mary, Newington, has been fined five pounds at the Lambeth Police Court for failing to properly fit certain houses belonging to him with the regulators required in connection with a constant supply of water. Mr. Oakley, also, was fined one pound at the same court for a similar offence.

A tract of twenty-eight acres, the munificent gift of Sir W. Armstrong, C.B., which has been added to the Heaton Park, Newcastle-on-Tyne, has been opened to the public. Mr. Albert Grey, M.P., who was the chief speaker at the inauguration, dwelt on the great importance of preserving open spaces in and near our great towns, which would prove inestimable blessings to the present and future generations.

NOTES OF THE MONTH.

LOCAL LEGISLATION AS TO INFECTIOUS DISEASES.

It is satisfactory to record that there is a likelihood of an appreciable increase being made, in the course of the ensuing session, in the number of towns where notification of infectious diseases is compulsory, and where the imperfect powers given by the Public Health Act with regard to such diseases are supplemented by further and more stringent provisions. No less than seven boroughs (Barrow-in-Furness, Birkenhead, Bradford, Lincoln, Reading, Salford, and Stalybridge) are proposing in the coming session to introduce local bills to provide for the compulsory notification of infectious cases. In addition, powers for the provision of hospitals, and for the removal of infected persons thereto, are asked for by Barrow-in-Furness, Bradford, Lincoln, Reading, Salford, and Stalybridge. Powers to close schools, dairies, and shops where infectious disease exists are sought by Bradford, Lincoln, and Salford; and power to close milk shops by Barrow. Powers with regard to removal to mortuaries are desired by Barrow, Birkenhead, and Lincoln; with regard to the use of public conveyances for infectious cases, by Barrow and Lincoln; for the provision of nurses, and temporary shelter and accommodation, by Lincoln and Salford; and for the disinfection of infected places and things by Lincoln. Taken in connection with the powers granted during the last four years to the seventeen towns where there is now compulsory registration of infectious disease, the provisions in these new local bills indicate a widening dissatisfaction with the Public Health Act which it is to be hoped the Legislature will appraise at its proper value. That there should be different public health laws in every town that is ambitious enough and rich enough to set up a local code of its own is hardly a state of affairs that Parliament or the Local Government Board ought to regard with equanimity. If the registration of infectious disease be desirable—as undoubtedly it is—local authorities should be able to enforce it in their districts without the trouble and expense of a local Act.

THE SANITARY COMMISSIONER OF CYPRUS.

We are glad to be able to state that Dr. Frederick W. Barry, whose provisional appointment as Sanitary Commissioner of Cyprus we reported in our March number, has now been confirmed in that office. We have already sketched out the duties which Dr. Barry will be called upon to fulfil in his new capacity (page 344 of our last volume), and we do not doubt that he will be as successful in the sanitary administration of Cyprus, as he admittedly was in that of the Craven District. Certain circulars as to vaccination and Officers of Health, which Dr. Barry has already issued in Cyprus, show that he is working on sound and well-considered principles; and we wish him every success in his enlarged and more important sphere of labour.

FOOD VALUES.

Professor W. O. Atwater, in an essay on the nutritive value of fish, gives the following table. Taking medium beef at 100, we should have, as the nutritive value of like weights of fish free from bone; Medium beef, 100; fresh milk, 23.8; skimmed milk, 18.5;

butter, 124.0; cheese, 155.0; hen's eggs, 72.0; codfish, fresh, 68.0; flounders, 65.0; halibut, 88.0; striped bass, 79.0; mackerel, 86.0; lake trout, 91.0; eels, 95.0; shad, 99.0; salmon, 104.0; salt mackerel, 111.0; dried codfish, 346.0.

THE ARTIZANS' DWELLINGS ACT IN NEWCASTLE-ON-TYNE.

By a scheme brought before the last meeting of the Newcastle Town Council, it appears that body intend to seek powers to abandon the Artizans' Dwellings Act, so far as it requires them to provide a site or dwellings for the poor people who are to be evicted from the doomed rookeries of the Pandon district, on the plea that a sufficient number of empty dwellings now exist in other parts of the town. They intend to clear the sites under the Towns Improvement Act, and to form three new streets in the district, at an estimated cost of upwards of £90,000. The Corporation expect to recoup themselves to the extent of about £18,000 by the sale of surplus land, etc. The probable effect of this improvement scheme will be to drive the evicted inhabitants to overcrowd other existing rookeries, as experience has shown that persons of this class evince no disposition to pay the higher rents necessarily asked for improved dwellings.

ALCOHOL IN HOSPITALS.

A committee was lately formed at St. George's, to ascertain the comparative use of alcohol in 12 large London hospitals. About a fourth of the patients, it is found, in all the hospitals are under daily treatment with stimulants other than malt liquor, which would seem to be a matter almost of course. The proportion of those receiving wine and stimulants is almost the same at St. George's. The variation in the quantity of wine and spirit per patient in the different hospitals is not satisfactory, and implies a want of principle or uniformity. Thus, in 12 London hospitals the quantity of wine annually consumed varied from 6.145 oz. to 45.248 oz. per patient; spirits from 7.098 oz. to 32.980 per patient; the equivalent of alcohol in wine and spirits varied from 4.537 oz. to 21.117 oz. The annual average of the equivalent of alcohol consumed per patient is less than in St. George's in seven hospitals, and in four it is higher. We now come to the record of 'previous habits', from which it would appear that there is too much homœopathy in the use of much of the alcohol in hospitals to be consistent with sound medical practice:—'Certain patients are reported to have been accustomed, previous to admission, to a daily consumption of three or four pints of beer, and two glasses of whisky (age 53); four or five pints of beer, with frequent excesses (age 59); ten pints of beer and ten glasses of whisky (age 23); hard drinkers, chiefly of rum (age 30); indulged in great excesses, often drink two bottles of brandy a day (age 43); eight pints of beer daily (age 42); four pints of beer, with excesses (age 38); eight pints of beer daily (age 42); five pints of beer, with excesses (ages 38); three glasses of whisky (age 34); one pint of beer and six glasses of whisky, with excesses (age 45); eight pints of beer, with two pints of gin or whisky (age 43); one or two pints of beer, with ten glasses of spirits (age 36); up to ten or twelve pints of beer, and four glasses of whisky (age 22); twelve pints of beer, and five glasses of gin, with excesses (age 41); from eight to ten pints of beer, and sometimes a pint of gin (age 39); from sixteen to twenty pints of beer, and a glass of spirits (age 54); described himself as a hard drinker of wines and spirits (age 22); twelve pints of beer, and eight glasses of spirits (age 38); ten or twelve pints of beer, and from half to one pint of gin (age 55); one pint of beer, with three-quarters of a pint of gin daily, with frequent excesses (age 45); one to two pints of beer, and one pint of sherry (age 53); one bottle of claret (age 39); one gallon of beer frequently (age 33); beer very freely (age 34); four pints of beer, and much spirits (age 39); from three to four pints of beer, and from one to twelve glasses of rum (age 54); seven pints of beer, and seven glasses of spirits (age 41); drunk three times a week (age 36); a confirmed drunkard (age 33); immense quantities of whisky (age 45); twelve to fourteen pints of beer, and a variable amount of rum (age 31); ten pints of beer, and a pint and a half of rum (age 45); the largest consumer of beer 'never exceeded' twenty-six pints a day (age 35); the largest consumer of spirits took twenty to thirty glasses of gin daily (age 30). Some of these patients are said to be "gouty". Only one total abstainer can be discovered.'

THE GREENING OF PRESERVED VEGETABLES.

M. Lecourt, a manufacturer of preserved provisions of Paris, and Professor Guillemare, of the Lycée of Rheims, have devised a new process for colouring preserved vegetables without the use of salt of copper, which is the subject of an interesting report addressed to the Consultative Committee of Public Hygiene of France by MM. Wurtz, Gavarre, and Bussy. This new process consists in adding to the vegetables employed a surcharge of chlorophyll, so that after the inevitable loss caused by boiling at 120 deg. Cent, they still retain sufficient to present the green colour of fresh vegetables. MM. Lecourt and Guillemare, obtain the green colour thus utilised from table vegetables, especially spinach, which contains a great quantity that is easily extracted. By an appropriate manipulation they obtain this green matter in solution in water alkalised by soda. The application of the colour is made thus—the vegetables being plunged in boiling water, previously acidulated by chlorohydric acid, a suitable quantity of the solution of chlorophyll is turned into the water; by saturation of the soda, by means of chlorohydric acid, sea salt is produced, and the colouring matter is deposited in the organic tissue to increase the intensity of its proper colour. The vegetables thus treated are submitted to several washings before being enclosed in the vessels in which they are to be submitted to the high temperature necessary to preserve them.

TEMPERATURE AND RAINFALL IN LONDON.

At the last meeting of the British Association, Mr. H. Courtenay Fox read a paper on this subject, framed on data collected from the Royal Observatory for a period extending between 1815 and 1880. The conclusions were, that in London a cold spring is very prone to be followed by a cold summer; a cold summer tends to be followed by a cold autumn; and a cold autumn has a slight tendency to be succeeded by a winter of low temperature. Warm summers are generally followed by warm autumns. In no fewer than eight out of the twelve months (that is, in every one except February, March, May, and October) very low temperature tends to be prolonged into the succeeding months. If June, July, August, or December be warm, the next month will probably be a warm one; also the two months June and July tend, when

very dry, to be followed by dry ones. On the other hand, a dry August indicates the probability of a wet September. A wet December is apt to be succeeded by a wet January. In addition to the foregoing, there are also a few instances in which the rainfall of certain months appears to be definitely related to antecedent extremes of temperature, and *vice versâ*. Thus, if August or September be warm, the ensuing September or October inclines to be wet; if, on the other hand, September or November be cold, the succeeding October or December is likely to be a dry month; if February, June, or July be very dry, the next month has a strong tendency to be warm. If January, March, or April be wet, we may also expect the next month to be a warm one; but a wet May or July gives a strong probability of cold weather in June or August respectively.

AN ANCIENT COLUMBARIUM.

A writer in the *Glasgow Herald*, thus describes an ancient Columbarium on the Appian Way at Rome: 'A few yards further on the road, you enter another building and another period (that of Augustus and his immediate successors), when cremation was in full blast. This is a Columbarium, or antique pigeon-house, if the word be taken literally, where the ashes and calcined bones of the dead, placed in little earthen vases like so many apothecary's pots, are set in little niches like pigeon-holes, in nine rows all around the walls. Beneath each niche is a marble label set in the wall, and telling the name, age, and quality of the ashes when they died. The surviving friends of some individuals have expressed their affection in more elaborate fashion. A broken-nosed bust, all green with damp, representing a piquant and bright-faced young girl, labelled Julia, and wearing rows of curls on her forehead, is the tribute that a loving brother has placed over the calcined remains of his sister. As you lift the lids of these little pots, and take up the dust and tiny bits of bone of the very early dead, the old woman who is the guide, and who stands at the top of the long stair that leads down to this small but crowded cemetery, cries out, in an asthmatic voice, that it is forbidden to carry anything away, and glares down upon you as if you were a ghoul. If one could summon up the dead, what a strange gathering there should be here! There are over 200 labels with names upon them, but that falls short of the number of interments, for it was the custom to put the ashes of several friends into the same vase. The occupants of these pigeon-holes were the familiars and servants in the imperial household from Augustus to Nero. From one inscription you learn that the Commissariats of the first and tenth Legions rest in this tiny earthen vase; in another are the ashes of the gentleman who held the stirrup for the Emperor Claudius when he mounted his horse; here in one little pot is all that is left of the cashier of Augustus; in another the dust of that ancient Yorick, the Court buffoon, who amused the saturnine Tiberius by mimicking the lawyers of the period. On a marble vase is a piteous appeal to modern Vandals, begging them not to touch the remains within, but to respect the gods' manes; and around the pigeon-holes are paintings on the walls representing birds, and fruits, and flowers, and butterflies, and symbolical and mythological figures. In certain places you find amphoræ or jars, from which libations were poured, and plates on which meats were offered to the manes of the deceased.'

THE PUBLIC HEALTH

DURING NOVEMBER 1880.

THE mean temperature during November at the Royal Observatory, Greenwich, was 42°.6, which was 0°.3 above the average November temperature in 100 years. The temperature last month, although differing but slightly from the average November temperature, showed a considerable excess upon that recorded in November 1878 and 1879. An excess of temperature prevailed on fifteen days of the month, whereas the mean was below the average on each of the other fifteen days. The warmest day in the month was the 13th, when the mean was 55°.0 and 12°.7 above the average; the coldest day was the 22nd, when the mean was only 29°.4 and showed a deficiency of 11°.7. Rain was measured at Greenwich on 14 of the 30 days of the month, to the aggregate amount of 2.1 inches; the average November rainfall recorded at Greenwich during 61 years was 2.3 inches, or slightly in excess of the amount recorded last month. During the six months ending November no less than 20.9 inches of rain were measured, exceeding the average amount for that period by no less than 6.4 inches. The sun was above the horizon during 264.4 hours during November, but only 54.3 hours of bright sunshine were recorded; this amount, however, exceeded that measured in either of the two preceding corresponding months. South-westerly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar General's Weekly Return, containing an estimated population of about seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 20,259 births and 12,756 deaths were registered during the four weeks ending 27th November. The births were equal to an annual rate of 35.2 per 1000 of the estimated population in the twenty towns; it was 35.7 in London, and 34.8 in the nineteen provincial towns, and ranged from 28.6 and 29.6 in Brighton and Plymouth, to 36.9 in Nottingham and Newcastle-upon-Tyne, and 38.3 in Wolverhampton.

The annual death-rate during the four weeks of November was equal to 22.2 per 1000, against 24.1 and 22.1 in the two preceding months. The average November death-rate in these towns in the three years 1877-8-9 were respectively 22.2, 23.8 and 22.9. English urban mortality during November was therefore somewhat below the average.

The lowest annual rate of mortality in the twenty towns last month was 18.2 per 1000 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Sheffield, 18.8; Birmingham, 19.3; Bradford, 19.5; Leeds, 19.8; Brighton, 20.3; Plymouth, 20.7; Hull, 21.3; London, 21.9; Bristol, 22.3; Nottingham, 22.6; Newcastle, 22.7; Leicester, 22.9; Oldham, 23.2; Norwich, 24.2; Wolverhampton, 24.2; Manchester, 24,3; Sunderland, 24.9; Salford, 26.5; and the highest rate during the month was 27.3 in Liverpool. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during November averaged 22.4 per 1000, while in London it was equal to 21.9. The high death-rates last month in Manchester, Sunderland, Salford, and Liverpool were to some extent due to excessive zymotic fatality.

The 12,756 deaths from all causes in the twenty

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,664,149	10019	6159	1377	1087	*	*	*	1439	782	53	152	303	54	58	76	96	1475	689	209	1140	35.7	21.9	2.8	5.3	
Abersychan	14,000	37	19	..	5	2	1	6	5	..	..	..	..	..	..	..	..	8	1	2	..	32.1	16.5	0.0	7.0	J. W. Mulligan, M.D.
Abingdon	6,033	16	2	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	32.3	4.0	0.0	0.0	W. T. G. Woodforde, M.D.
Accrington	30,000	100	44	9	8	3	3	14	7	4	..	1	..	..	..	1	2	10	4	1	..	40.6	17.8	1.6	4.1	T. Milne, M.A., M.D.
Acton†	16,000	48	20	7	3	..	1	6	3	..	..	..	..	..	..	..	..	3	5	..	..	39.1	16.3	0.0	2.4	T. Francis.
Altrincham	12,000	32	23	3	7	4	1	3	5	8	..	..	7	..	1	..	..	4	1	..	2	32.5	23.3	8.1	4.1	G. H. Atwell.
Ashton-under-Lyne	33,417	97	92	26	14	7	10	14	21	11	..	..	7	2	..	1	1	16	5	..	16	35.3	33.5	4.0	5.8	W. H. Hughes.
Aspull	8,000	29	9	1	5	2	..	..	1	4	..	2	2	..	..	.	..	2	..	..	..	44.1	13.7	6.1	3.1	H. Smith.
Astley Bridge	5,750	20	6	1	..	1	1	2	1	..	..	..	..	..	..	..	..	2	1	..	..	42.3	12.7	0.0	4.2	R. Settle, M.D.
Aston Manor	52,821	166	71	19	12	5	5	20	10	11	..	1	1	3	2	2	2	18	10	..	..	38.2	16.4	2.5	4.1	H. May.
Audenshaw	6,000	14	11	1	4	1	3	..	2	2	..	..	..	..	1	1	..	1	..	..	..	28.4	22.3	4.1	2.0	R. Slater.
Baildon†	5,000	17	5	1	..	1	..	3	..	..	..	..	..	..	..	..	..	..	3	..	..	44.3	13.0	0.0	0.0	H. Walker.
Banbury†	13,500	*	11	..	..	..	1	4	6	..	..	..	..	..	..	..	..	2	2	..	..	*	10.6	0.0	1.9	R. Grimbly.
Bangor	7,835	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. Rees.
Barnsley	30,000	97	56	14	8	*	*	*	16	6	..	..	..	..	..	1	2	3	8	8	1	5	39.3	22.7	2.4	3.2	M. T. Sadler, B.A., M.D.
Barrow-in-Furness	40,000	154	77	19	23	3	11	14	7	11	..	..	1	4	5	1	..	23	3	2	3	46.8	23.4	3.3	7.0	J. Settle.
Bath†	53,649	94	81	16	6	5	4	18	32	5	..	..	1	..	..	4	..	15	4	2	16	22.8	19.7	1.2	3.6	A. B. Brabazon, M.D.
Batley	29,851	86	65	24	16	2	1	15	7	15	..	..	4	..	5	3	3	15	2	..	..	35.0	26.5	6.1	6.1	W. Bayldon.
Beccles	5,000	12	7	..	3	1	1	1	1	3	..	..	3	..	..	..	..	1	..	..	..	41.4	17.0	7.3	2.4	E. B. Crowfoot, M.B.
Beckenham†	12,200	29	13	5	2	..	..	3	3	1	..	..	..	..	..	..	1	5	1	..	..	31.0	13.9	1.1	5.3	C. O. Baylis, M.D.
Belgrave	8,000	17	8	4	2	..	..	..	2	1	..	..	..	..	..	..	1	1	..	..	..	25.8	12.2	1.5	0.0	A. W. Emms.
Bethesda	6,610	9	5	..	1	..	1	2	1	2	..	..	..	..	..	2	..	2	..	..	..	16.6	9.2	3.7	3.7	H. Rees.
Bilston	25,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	S. G. Gilbert.
Bingley	9,000	19	10	..	1	1	3	1	4	2	..	..	1	..	..	1	..	1	2	..	..	25.7	13.5	2.7	1.4	J. W. Craig, M.D.
Birmingham†	394,738	1096	578	164	92	28	24	167	103	46	..	2	5	5	8	8	18	157	43	19	72	36.2	19.1	1.5	5.2	A. Hill, M.D.
Bisley	5,264	14	8	2	1	..	..	2	3	..	..	..	..	..	..	..	..	2	1	..	..	32.3	18.5	0.0	4.6	T. Partridge.
Blackrod	4,000	10	8	6	2	..	..	..	..	1	..	..	..	..	..	1	..	3	..	1	..	30.4	24.3	3.0	9.1	H. Smith.
Blyth	2,000	9	7	1	1	..	2	1	2	..	..	..	..	..	..	..	..	..	1	..	..	54.9	42.7	0.0	0.0	H. D. Ward, M.D.
Bolton‡	106,500	339	220	55	55	11	12	47	40	41	..	2	14	..	10	3	12	56	17	9	2	33.2	21.5	4.0	5.5	E. Sergeant.
Bootle-cum-Linacre	26,500	11	40	11	8	1	6	5	9	5	..	..	3	1	..	1	..	6	6	..	..	*	18.4	2.3	2.8	R. J. Sprakeling.
Boston†	15,000	47	23	4	3	1	2	5	8	1	..	..	..	..	..	..	..	8	3	3	7	40.8	20.0	0.0	7.0	W. Clegg.
Bradford (Lanc.)†	15,000	55	30	12	5	4	3	3	4	1	..	..	..	..	..	1	..	8	3	..	..	47.8	31.3	0.9	7.0	J. Hudson.
Bradford (Yorks.)†	197,196	528	295	69	60	21	18	81	46	41	..	2	16	..	6	12	5	68	21	5	28	34.9	19.5	2.7	4.5	H. Butterfield.
Braintree	5,000	*	5	..	..	..	..	2	3	..	..	..	..	..	..	..	..	..	1	..	..	*	12.1	0.0	0.0	J. Harrison.
Brentford	11,557	43	26	8	4	2	1	7	4	1	..	..	..	..	..	..	1	6	4	..	..	45.3	27.4	1.1	6.3	J. Williams, S.Sc.C.Camb.
Bridgnorth	6,000	12	5	1	..	..	..	3	1	1	..	..	..	..	..	..	1	..	..	..	..	24.3	10.1	2.0	0.0	A. Mathias.
Bridgwater	13,000	27	25	5	..	1	1	7	11	1	..	..	..	..	..	..	1	..	2	..	7	25.3	23.4	0.9	0.0	F. J. C. Parsons.
Bridport	8,145	13	11	2	1	..	1	4	3	..	..	..	..	..	..	..	..	3	2	..	2	19.4	16.4	0.0	4.5	G. M. Evans.
Brighton†	107,321	235	167	32	*	*	*	*	43	24	..	5	20	2	3	5	2	*	*	2	25	28.6	20.3	2.9	*	
Bristol†	213,536	516	365	90	*	*	*	*	103	33	..	2	18	2	1	2	8	*	*	11	49	31.5	22.3	2.0	*	
Bromley (Kent)‡	14,093	34	12	4	1	..	1	6	..	1	..	..	..	..	..	1	..	3	1	1	..	31.0	10.9	0.9	2.7	C. O. Baylis, M.D.
Bromsgrove	6,967	12	12	2	1	..	..	4	5	1	..	..	..	..	..	..	1	2	1	..	2	20.9	20.9	1.7	3.5	C. Carey.
Brownhills	11,000	29	16	7	1	2	..	4	2	4	..	..	4	..	..	..	..	2	..	..	..	32.1	17.7	4.4	2.2	D. E. Flinn.
Burnley†	26,000	82	82	31	8	8	2	20	13	20	..	..	2	..	..	3	5	24	7	..	..	*	19.1	2.3	5.6	T. Dean, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

‡ The statistics for these Sanitary Districts relate to four weeks, or 28 days.

† The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Burslem	29,159	80	59	12	24	..	2	15	6	19	..	12	..	..	4	1	2	14	3	..	..	33.4	24.6	7.9	5.8	J. M. Taylor.
Burton-upon-Trent	33,000	135	58	11	6	2	1	23	15	6	..	2	..	..	1	1	2	15	9	3	7	49.8	21.4	2.2	5.5	C. Perks.
Bury†	50,000	187	67	17	11	*	*	*	23	9	1	..	3	..	..	3	2	17	1	..	7	33.1	17.5	2.3	4.4	H. Ashworth.
Bury St. Edmunds	15,600	40	19	3	4	..	1	4	7	1	..	..	..	..	1	..	..	2	2	1	4	31.2	14.8	0.8	1.6	F. W. Clarke.
Camborne	15,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. S. Angove.
Cambridge	34,500	85	52	7	6	5	4	12	18	5	..	2	..	..	..	2	1	9	8	1	15	30.0	18.3	1.8	3.2	B. Anningson, M.D.
Canterbury‡	20,962	65	36	8	3	1	..	11	13	2	..	..	..	..	..	..	2	4	2	2	5	32.3	17.1	1.0	2.0	F. Wacher.
Cardiff	82,364	245	134	31	27	8	8	30	30	24	..	..	3	1	7	8	5	32	13	7	18	36.2	19.8	3.5	4.7	H. J. Paine, M.D.
Carlisle†	35,000	82	67	11	12	2	7	17	18	3	..	..	1	..	..	1	1	13	1	..	6	30.5	25.0	1.1	4.8	R. Elliot, M.D.
Carnarvon	10,407	14	15	2	1	2	..	6	4	..	..	..	..	..	..	..	..	5	3	..	2	16.4	17.5	0.0	5.8	H. Rees.
Chatteris	4,769	8	2	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	20.4	5.1	0.0	0.0	M. O'Conner.
Chelmsford	9,700	30	15	4	1	1	1	3	5	..	..	..	..	..	..	..	..	2	2	1	1	37.6	18.8	0.0	2.5	E. H. Carter.
Cheltenham†	45,000	67	70	14	1	4	2	20	29	2	..	..	..	..	..	..	2	16	7	2	6	19.4	20.3	0.6	4.6	T. Wright, M.D.
Chiswick	12,000	36	21	7	2	..	..	5	7	3	..	..	2	..	..	1	..	5	3	..	..	36.5	21.3	3.0	5.1	F. C. Dodsworth.
Cirencester†	7,000	*	17	3	3	1	3	..	7	2	..	2	..	..	..	..	..	3	2	..	3	*	31.7	3.7	5.6	F. T. Bond, M.D.
Cleckheaton	9,250	20	18	2	4	1	1	1	8	3	..	..	..	..	..	2	1	6	1	..	..	26.3	23.7	3.9	7.9	H. O. Steele.
Cockermouth	5,550	*	9	1	4	1	1	..	2	5	..	..	4	1	..	..	..	2	..	..	4	*	20.5	11.4	4.5	J. Ward, M.D.
Colchester	28,924	76	53	6	8	4	4	11	20	6	..	..	5	..	..	1	..	9	5	2	13	32.0	22.3	2.5	3.8	E. Waylen.
Congleton†	12,000	25	24	2	4	..	2	9	7	2	..	..	..	..	..	2	..	6	4	1	..	27.1	26.1	2.2	6.6	P. M. Davidson.
Consett†	7,868	18	7	..	4	1	..	2	..	3	..	..	3	..	..	..	..	4	..	..	..	29.8	11.6	5.0	6.6	W. M. Renton, M.D.
Coseley	23,000	63	39	13	7	..	1	4	14	5	..	..	..	..	2	..	3	12	..	2	..	33.3	20.6	2.6	6.3	J. Eagleton.
Coventry†	41,000	117	70	16	18	3	2	13	18	5	..	2	..	..	2	..	1	15	3	1	5	37.2	22.3	1.6	4.8	M. A. Fenton, M.D.
Cowpen	5,000	10	1	..	..	..	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	24.3	2.4	2.4	0.0	H. D. Ward, M.D.
Crewe	26,737	99	33	8	12	3	2	4	4	10	..	..	7	..	..	3	..	5	1	..	..	45.0	15.0	4.6	2.3	T. C. Bailey.
Crompton†	10,000	24	13	3	1	1	2	2	4	2	..	..	..	..	..	2	..	3	2	..	..	31.3	16.9	2.6	3.9	W. Brooke, M.D.
Croydon	71,000	236	109	20	16	17	2	32	32	11	1	..	5	2	..	2	1	21	14	2	21	40.4	18.7	1.9	3.6	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	*	5	2	1	1	..	1	..	1	..	..	..	..	..	..	1	..	..	..	..	*	15.9	3.2	0.0	L. Armstrong.
Derby†	80,385	198	131	34	21	4	8	25	39	11	..	1	1	..	1	6	2	28	15	5	14	32.1	21.2	1.8	4.5	W. Iliffe.
Dereham, East	5,790	15	7	1	..	..	..	3	3	..	..	..	..	..	..	..	..	2	1	..	..	31.5	14.7	0.0	4.2	H. B. Vincent.
Devonport†	50,000	*	77	16	13	2	4	20	22	4	..	1	2	..	..	1	..	12	7	..	7	*	20.1	1.1	3.1	J. May, jun.
Dorchester	7,500	13	10	5	1	..	..	3	1	1	..	..	..	..	..	..	1	..	2	..	1	21.1	16.2	1.6	0.0	E. J. Day.
Dover	33,636	97	59	14	3	1	6	15	20	1	..	..	..	..	..	1	..	14	11	4	10	35.1	21.3	0.4	5.1	M. K. Robinson, M.D.
Droitwich†	3,600	8	5	1	1	..	..	..	3	..	..	..	..	..	..	..	..	..	..	1	2	29.0	18.1	0.0	0.0	H. Swete, M.D., S.Sc.C. Camb.
Droylsden	8,000	21	15	1	4	..	3	3	4	1	..	..	..	..	1	..	..	2	2	..	..	31.9	22.8	1.5	3.0	R. Slater.
Eastbourne	18,000	*	20	3	1	2	1	7	6	1	..	..	..	..	..	1	..	3	4	1	1	*	13.5	0.7	2.0	E. F. Fussell, M.B.
East Ham	9,937	39	11	5	3	2	..	..	1	2	..	..	2	..	..	..	..	5	..	..	3	47.7	13.5	2.4	6.1	H. H. Mason, S.Sc.C.Camb.
Ebbw Vale†	17,000	34	18	5	3	4	3	1	2	..	..	..	..	..	..	..	..	4	1	6	..	26.1	13.8	0.0	3.1	J. W. Davies, M.D.
Epsom	7,550	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. L. Jacob.
Eton	2,806	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	21.6	0.0	0.0	0.0	A. J. Southey.
Evesham	4,888	*	12	2	..	1	1	4	4	1	..	..	..	1	..	..	..	2	1	..	1	*	29.9	2.5	5.0	G.H.Fosbroke,jun.,S.Sc.C.Cam.
Failsworth	8,000	*	10	2	3	1	1	1	2	..	..	..	..	..	..	..	..	3	1	..	..	*	15.2	0.0	4.6	G. W. Beattie, M.D.
Farnham	5,000	6	13	3	..	2	..	..	7	1	..	1	..	..	..	..	..	1	..	1	4	14.6	31.6	2.4	2.4	S. G. Sloman, jun.
Fenton	14,000	48	16	3	3	2	..	4	4	1	..	..	..	..	..	1	..	5	1	..	..	41.7	13.9	0.9	4.3	A. V. Griffiths.
Finchley†	11,339	29	10	2	2	1	..	4	1	3	..	1	..	..	1	..	1	2	1	..	..	33.3	11.5	3.4	2.3	J. Turle, M.D.
Fleetwood	5,000	17	5	4	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	41.4	12.2	.0	2.4	J. Porter.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from										Deaths in Public Institutions	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
GARSTON†	8,500	22	8	2	..	2	..	2	2	1	..	1	..	..	..	..	..	3	..	..	..	33.7	12.3	1.5	4.6	J. A. Fisher.
GLOSSOP	18,697	54	49	11	12	1	4	8	13	6	..	3	1	..	..	1	1	18	8	..	..	35.1	31.9	3.9	11.7	J. Rhodes.
GLOUCESTER	37,907	105	60	17	7	3	3	16	14	6	..	..	..	..	1	2	3	10	7	..	3	33.8	19.3	1.9	3.2	J. P. Wilton.
GOOLE	10,205	32	19	4	1	2	1	3	8	3	..	..	..	..	..	2	1	3	..	..	..	38.1	22.6	3.6	3.6	J. Mitchell Wilson, M.B., S.Sc.C.
GORTON†	32,000	73	52	14	10	5	1	17	5	13	..	3	3	..	..	4	3	14	3	..	..	29.7	21.2	5.3	5.7	R. E. Hammond.
GREAT DRIFFIELD	6,033	17	17	4	2	..	..	7	4	1	..	..	..	..	..	1	..	..	1	..	..	34.3	34.3	2.0	0.0	D. Ridpath, M.D.
GUILDFORD	10,167	29	12	2	1	1	..	1	7	..	..	..	..	..	..	..	..	2	1	..	..	34.7	14.4	0.0	2.4	J. Morton, M.B.
HALIFAX†	72,000	187	108	21	14	*	*	*	23	6	..	..	1	..	..	4	1	36	11	..	17	33.9	19.6	1.1	6.5	D. Ainley.
HANDSWORTH (STAFFORD)	22,630	59	22	2	1	1	1	6	11	1	..	..	1	..	..	..	..	5	2	..	..	31.7	11.8	0.5	2.7	J. B. Welch, M.B.
HARBORNE	6,000	14	13	3	1	1	1	2	5	2	..	..	..	..	1	..	1	..	2	..	2	28.4	26.4	4.1	0.0	R. W. Smith, M.D.
HARWICH	7,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. K. Morgan.
HASLINGDEN†	14,000	39	19	2	6	1	..	7	3	1	..	1	..	..	..	..	..	5	..	..	..	36.3	17.7	0.9	0.0	J. A. Harrison, M.D.
HASTINGS†	39,780	76	67	11	8	..	4	17	27	4	..	..	..	1	..	1	2	14	8	..	1	24.9	22.0	1.3	4.6	C. Ashenden.
HENDON†	9,297	26	11	6	..	1	1	1	2	..	..	..	..	..	..	..	..	5	..	..	1	36.5	15.4	0.0	7.0	J. Cameron, M.D.
HEYWOOD	25,000	*	43	8	5	2	3	17	8	7	..	1	5	..	..	1	..	6	5	..	..	*	20.9	3.4	2.9	H. Wisken.
HINCKLEY	7,500	24	20	5	7	1	2	2	3	3	..	1	..	..	..	1	1	..	2	1	2	39.0	32.5	4.9	0.0	W. H. Griffiths.
HINDLEY	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
HORWICH	4,315	*	8	..	..	2	..	3	3	..	..	..	..	..	..	..	..	2	..	..	..	*	22.5	0.0	5.6	G. H. Whitaker.
HUDDERSFIELD†	81,780	198	182	33	24	16	10	55	35	35	..	1	..	1	..	31	2	42	18	3	16	29.5	29.0	5.6	6.7	J. S. Cameron, M.D., B.Sc.
HULL†	149,627	420	244	64	*	*	10	*	55	35	..	..	4	..	14	7	10	*	*	8	20	36.6	21.3	3.1	*	
HURST	7,000	22	9	4	..	1	..	2	2	1	..	..	1	..	..	..	..	5	..	..	..	38.3	15.7	1.7	8.7	T. Cooke.
HYDE	28,218	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
ILFRACOMBE	5,300	11	5	..	..	..	..	2	3	..	..	..	..	..	..	..	..	1	1	..	..	24.3	11.1	0.0	2.2	E. J. Slade-King, M.D., S.Sc.C.
ILKESTON	12,356	51	31	11	9	1	..	3	7	4	..	..	2	..	..	1	1	6	..	2	..	50.2	30.5	3.9	5.9	R. Wood.
IPSWICH	48,001	102	63	18	2	1	5	16	21	3	..	..	..	..	..	1	2	15	7	1	8	25.9	16.0	0.8	3.8	G. S. Elliston.
KEIGHLEY	24,000	59	27	6	2	2	3	10	4	3	..	..	1	..	..	2	..	3	3	..	2	29.9	13.7	1.5	1.5	A. Roberts.
LEAMINGTON	24,500	58	37	5	5	1	1	6	19	1	..	1	1	..	..	..	1	5	6	1	3	28.8	18.4	0.5	2.5	J. S. Baly.
LEEDS†	318,927	846	487	124	84	*	*	*	115	61	..	5	13	..	13	18	12	98	40	30	*	34.5	19.9	2.5	4.0	G. Goldie.
LEEK	12,527	26	20	7	2	1	1	4	5	4	..	2	1	..	..	..	1	..	3	1	1	25.2	19.4	3.9	0.0	J. J. Ritchie.
LEICESTER†	129,912	357	228	63	*	*	*	*	44	37	..	8	11	1	2	11	4	*	*	5	34	35.8	22.9	3.7	*	
LEIGH	20,600	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Hall.
LICHFIELD	8,129	26	16	4	1	1	2	3	5	1	..	..	..	..	..	1	..	1	3	..	..	38.9	24.0	1.5	1.5	G. A. Carter, M.D.
LINCOLN†	32,103	107	69	23	10	..	3	15	18	7	..	..	2	..	3	1	1	13	4	2	5	43.4	28.0	2.8	5.3	C. Harrison, M.D., S.Sc.C.C.
LITTLEHAMPTON	4,000	7	4	..	..	..	..	3	1	..	..	..	..	..	..	..	..	..	..	..	..	21.3	12.2	0.0	0.0	C. Kelly, M.D.
LIVERPOOL†	544,056	1530	1140	256	236	65	54	352	177	138	..	7	57	8	25	27	14	309	95	62	155	36.7	27.3	3.3	7.4	J. S. Taylor, M.D.
LIVERSEDGE	13,750	32	18	3	5	1	..	5	4	1	..	..	..	..	..	1	..	4	3	..	..	28.3	15.9	0.9	3.5	W. J. Sykes, M.D.
LOUTH	10,750	14	27	2	1	2	1	10	11	1	..	..	..	..	..	1	..	11	4	..	4	15.8	30.5	1.1	12.4	R. Domenichetti, M.D.
LUTON	24,200	70	36	10	6	3	1	4	12	8	..	1	2	1	..	2	2	5	4	..	6	35.2	18.1	4.0	2.5	H. Sworder.
LYTHAM†	5,000	4	4	1	..	..	..	2	1	..	..	..	..	..	..	..	..	1	2	..	..	10.4	10.4	0.0	2.6	W. E. Pountney, M.B.
MACCLESFIELD	38,641	108	65	11	7	3	5	21	18	..	..	..	..	..	..	..	..	14	5	..	5	35.9	21.6	0.0	4.6	G. Bland.
MAIDENHEAD	8,281	29	12	..	..	..	..	3	9	..	..	..	..	..	..	..	..	2	1	..	..	42.6	17.6	0.0	2.9	W. T. G. Woodforde, M.D.
MAIDSTONE‡	29,537	80	41	8	3	5	1	9	15	6	1	..	..	..	2	..	1	4	3	1	..	28.2	14.5	2.1	1.4	M. A. Adams.
MANCHESTER†	363,130	937	677	156	74	45	40	209	133	90	..	16	36	4	19	7	15	2	31	122		33.7	24.2	3.2	*	
MERTHYR TYDFIL†	52,000	126	123	28	28	5	10	28	24	27	1	23	..	..	..	2	2	28	10	1	6	31.6	30.8	5.8	7.0	T. J. Dyke.
MEXBOROUGH	6,000	24	11	5	*	..	..	3	1	1	..	..	..	..	..	1	..	5	..	..	..	48.7	22.3	2.0	10.1	W. Sykes.

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‡ The statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Middlesbrough	58,988	192	108	41	19	7	4	21	16	17	..	3	6	..	3	3	2	26	5	1	9	39.6	22.3	3.5	5.4	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. B. Knott.
Mirfield	12,725	26	20	3	3	1	3	3	7	3	..	..	..	1	..	2	..	3	3	..	..	24.9	19.1	2.9	2.9	W. Marsden.
Morley	12,100	47	18	5	6	2	..	3	3	3	..	..	2	..	..	1	..	2	..	..	..	47.2	18.1	3.0	2.0	S. T. Steele, S.Sc.C.Camb.
Moss-Side	16,500	44	19	8	1	..	1	6	3	5	..	2	..	..	2	1	..	2	3	..	..	32.4	14.0	3.7	1.5	A. E. Sutcliffe.
Neath	12,000	*	46	9	18	10	..	2	7	17	..	8	9	..	..	..	..	7	4	..	3	*	46.7	17.2	7.1	G. Ryding, M.D.
Nelson	12,000	22	9	3	3	1	..	1	1	2	..	..	1	..	..	..	1	2	..	..	..	22.3	9.1	2.0	2.0	T. Dean, M.D.
Newark†	13,746	25	19	7	4	..	1	1	6	3	..	..	1	..	1	..	1	3	1	..	1	23.7	18.0	2.8	2.8	A. Ashby, M.B.
Newbury	9,796	18	12	..	1	..	1	2	8	..	..	..	..	..	..	..	..	2	1	..	4	22.4	14.9	0.0	2.5	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	43	22	4	3	1	1	*	5	2	..	..	2	..	..	..	..	9	..	..	..	29.1	14.9	1.4	6.1	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	423	259	50	61	*	*	*	64	42	..	6	17	1	7	6	5	49	26	12	33	36.9	22.6	3.7	4.3	H. E. Armstrong.
Norwich†	85,827	207	159	43	*	*	*	*	42	28	..	..	18	..	1	7	2	*	*	3	15	31.5	24.2	4.3	*	———
Nottingham	173,627	491	334	85	63	15	14	84	73	40	..	1	13	2	14	8	2	99	28	5	25	36.9	23.4	2.8	6.9	E. Seaton, M.D.
Nuneaton	7,400	29	20	9	2	1	..	5	3	2	..	..	1	..	..	..	1	..	2	..	..	47.7	32.8	3.3	0.0	E. Peacock.
Oldham†	115,413	272	205	45	40	15	8	45	46	31	..	3	21	..	2	2	3	57	14	6	18	30.7	23.2	3.5	6.4	J. M. Sutton, M.D.
Ovenden	8,000	21	5	1	..	..	..	2	2	..	..	..	..	..	..	..	..	1	1	..	..	31.9	7.6	0.0	1.5	J. Steele.
Oxford†	37,500	120	47	13	3	1	4	6	20	2	..	..	..	..	..	1	1	7	4	1	7	41.7	16.3	0.7	2.4	A. Winkfield.
Padiham and Hapton‡	9,000	44	15	*	*	*	*	*	*	4	..	..	3	..	..	1	..	2	2	1	..	27.8	17.4	4.6	2.3	J. G. Booth.
Pembroke	15,000	32	23	3	5	5	1	3	6	1	..	..	..	1	..	..	..	4	..	..	..	26.0	18.7	0.8	3.2	D. P. Saer.
Penzance	12,000	40	24	3	2	3	1	4	11	2	..	..	..	..	2	..	..	2	3	4	..	40.6	24.3	2.0	2.0	G. B. Millett.
Peterborough	20,000	60	20	9	3	..	..	4	4	..	..	..	..	..	..	..	..	3	2	..	1	36.5	12.2	0.0	1.8	W. S. Thomson, M.D.
Plymouth‡	74,993	210	145	26	14	5	11	40	49	7	..	1	1	1	..	..	4	34	19	1	10	29.2	20.2	1.0	4.7	H. Greenway.
Pontypool	5,700	17	8	..	..	..	..	5	3	..	..	..	..	..	..	..	..	2	1	..	..	40.6	19.1	0.0	4.8	S. B. Mason.
Portsmouth†	134,224	368	187	45	*	*	*	5	42	34	..	..	1	9	10	11	3	*	*	4	26	35.8	18.2	3.3	*	———
Preston†	88,000	246	156	50	25	13	8	28	32	25	..	..	..	..	4	8	13	44	10	1	2	36.4	23.1	3.7	6.5	H. O. Pilkington.
Ramsgate†	22,200	55	18	4	2	1	2	4	5	1	..	..	..	..	..	1	..	4	2	..	..	32.3	10.6	0.6	2.3	E. Walford.
Ravensthorpe (Yorks.)	4,560	11	14	4	3	..	..	5	2	..	..	..	..	..	..	..	..	4	1	..	..	29.3	37.3	0.0	10.7	W. Marsden.
Rawmarsh	9,652	35	15	6	5	..	..	3	1	7	..	1	..	..	2	1	3	2	1	..	..	44.1	18.9	8.8	2.5	W. J. Smith.
Reading†	41,500	106	63	14	12	3	4	12	18	8	..	4	2	..	..	1	1	13	6	2	9	33.3	19.8	2.5	4.1	J. Shea, B.A., M.D.
Redditch†	10,070	*	22	6	4	1	2	5	4	2	..	..	..	..	1	..	1	4	5	..	..	*	28.5	2.6	5.2	C. C. Smith, M.B.
Redruth	9,500	18	17	4	4	2	..	3	4	4	..	2	..	..	2	..	..	4	1	..	..	23.0	21.8	5.1	5.1	J. S. Hichens.
Reigate	18,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. L. Jacob.
Richmond (Surrey)	19,500	41	33	7	2	..	2	8	14	4	..	..	..	..	..	2	2	7	3	1	1	27.4	20.6	2.5	4.4	J. T. Rowland, M.D.
Rochdale	72,720	154	122	21	32	6	10	27	26	16	..	..	8	1	2	2	3	22	14	..	..	25.8	20.4	2.7	3.7	J. Henry, M.D.
Rochester	18,500	53	34	7	2	1	2	12	10	5	..	..	5	..	..	..	..	7	3	2	5	34.8	22.4	3.3	4.6	J. Sladen-Knight, M.D.
Romsey	4,481	10	5	3	1	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	27.2	13.6	0.0	2.7	F. Buckell.
Rotherham†	34,404	111	57	15	12	1	2	15	12	5	..	..	2	..	..	3	..	16	11	1	5	42.1	21.6	1.9	6.1	J. Hardwicke, M.D.
Rowley Regis†	27,000	112	34	6	11	1	2	10	4	4	..	..	..	..	..	2	2	9	2	3	..	54.1	16.4	1.9	4.3	J. G. Beasley.
Rugby	8,916	28	12	1	1	3	..	2	5	1	..	..	..	..	..	..	1	2	1	..	..	38.2	16.4	1.4	2.7	G. Wilson, M.D.
Runcorn	14,000	61	19	8	1	..	..	4	6	1	..	..	..	..	..	..	1	7	1	..	..	53.0	16.5	0.9	6.1	R. H. Mouritz.
Rusholme†	12,500	29	9	3	1	1	..	2	2	1	..	..	1	..	..	..	..	2	..	..	..	30.2	9.4	1.0	2.1	J. Gregory.
Ryde	12,800	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. Platt Wilks, M.B.
Saffron Walden	5,942	13	7	3	..	..	1	2	1	..	..	..	..	..	..	..	..	1	1	..	2	26.6	14.3	0.0	2.0	W. Armistead, M.B.
Salford†	185,786	521	378	103	77	28	17	93	60	81	..	20	23	2	8	21	7	112	25	11	33	36.6	26.5	5.7	7.9	J. Tatham, M.D., S.Sc.C.Camb.
Selby	5,720	12	17	2	6	..	..	5	4	3	..	..	..	..	2	1	..	5	2	..	2	25.5	36.2	6.4	10.6	J. M. Wilson, M.B., S.Sc.C.C.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1,000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet Fever	Diphtheria	Whooping-Cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence.		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
SHEFFIELD†	304,938	821	439	115	*	*	*	*	74	48	..	10	4	2	9	13	10	*	*	12	57	35.1	18.8	2.1	*	T. W. Hime, B.A., M.B.
IRLEY†	7,000	18	15	3	3	..	..	3	6	4	..	3	..	..	..	..	1	1	1	..	..	33.5	27.9	7.4	1.9	J. H. Allden.
SITTINGBOURNE†	9,000	24	7	4	1	1	1	..	..	1	..	..	..	..	..	1	..	..	1	..	..	34.8	10.1	1.4	0.0	H. G. Sutton.
SLOUGH	5,890	10	5	..	..	1	..	..	4	..	..	..	..	..	..	..	..	1	..	..	..	20.7	10.3	0.0	2.1	A. J. Southey.
SMETHWICK	21,000	83	22	4	6	..	..	5	7	1	..	..	..	..	..	..	..	1	6	1	..	48.1	12.7	0.6	3.5	W. Sutton.
SOUTHPORT	34,100	84	64	23	3	3	4	18	13	7	..	..	1	..	..	5	1	21	5	1	1	30.0	22.9§	2.5	7.5	H. H. Vernon, M.D.
STALYBRIDGE‡	23,405	71	50	9	3	2	5	13	18	1	..	..	..	..	..	1	..	17	6	..	..	31.6	22.3	0.4	7.6	F. J. Roberts-Dudley.
STOURBRIDGE	9,376	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. Eagar, M.D.
STRATFORD-ON-AVON	7,899	*	12	1	1	..	2	4	4	1	..	..	..	..	..	..	1	1	..	1	..	*	18.5	1.5	1.5	G. H. Fosbroke, S. Sc. C. Camb.
STROUD†	7,608	20	8	3	1	..	1	2	1	..	..	..	..	..	..	..	..	1	2	1	1	34.2	13.7	0.0	1.7	T. Partridge.
SUNDERLAND†	116,730	284	224	42	59	*	*	*	47	64	..	..	45	1	7	5	6	35	10	6	28	31.7	25.0	7.1	3.9	H. J. Yeld, M.D.
SWANSEA	65,890	210	120	30	18	13	7	28	24	21	..	..	19	..	..	1	1	29	5	4	8	38.8	22.2	3.9	5.4	E. Davies.
SWINTON†	7,753	33	16	6	4	2	..	3	1	2	..	..	1	..	..	..	1	7	..	..	..	55.5	26.9	3.4	11.8	C. S. Blythman, M.B.
TAMWORTH	4,846	18	6	1	1	1	..	1	2	1	..	..	1	..	..	..	..	..	..	1	..	45.2	15.1	2.5	0.0	H. J. Fausset, M.D.
TAUNTON	16,227	38	24	4	2	2	1	4	11	2	..	..	1	..	..	1	..	3	..	2	2	28.5	18.0	1.5	2.2	H. J. Alford, M.D.
TEIGNMOUTH†	7,250	19	5	1	..	..	1	1	2	..	..	..	..	..	..	..	..	..	1	..	..	31.9	8.4	0.0	0.0	W. C. Lake, M.D.
TEWKESBURY	5,500	11	9	2	1	..	1	2	3	..	..	..	..	..	..	..	..	1	..	..	4	24.3	19.9	0.0	2.2	W. Allard.
THORNHILL	10,636	31	6	4	1	1	..	..	..	2	..	..	1	..	..	..	1	..	2	..	..	35.2	6.9	2.3	0.0	W. Marsden.
TIVERTON†	10,400	29	16	..	1	..	1	6	8	..	..	..	..	..	..	..	..	2	3	2	2	36.3	*	2.0	2.5	J. P McNeill, M.D.
TORQUAY†	26,000	*	26	6	4	1	3	6	6	4	..	2	1	..	1	..	..	5	5	..	..	*	13.0	2.0	2.5	P. Q. Karkeek.
TOTTENHAM†	37,000	141	75	31	12	7	1	11	13	10	..	5	1	1	1	1	1	21	5	9	4	49.7	26.4	3.5	7.4	C. T. Conolly.
TOXTETH PARK‡	8,000	24	10	1	2	..	2	4	1	4	..	..	..	2	2	..	1	2	..	..	..	31.3	13.0	5.2	1.3	J. McClelland, M.D.
TREDEGAR	18,000	35	51	14	17	1	1	8	10	9	..	8	..	..	1	..	..	15	1	1	9	23.7	34.5	6.1	10.1	G. A. Brown.
TROWBRIDGE‡	12,000	28	43	6	26	2	1	4	4	32	..	31	..	..	..	..	1	..	2	..	..	24.3	37.4	27.8	0.0	G. C. Taylor, M.D.
TRURO	11,000	25	14	3	1	..	1	3	6	1	..	..	..	..	..	1	..	..	1	1	..	27.7	15.5	1.1	0.0	E. Sharp.
TUNSTALL	15,500	56	22	7	3	2	1	7	2	4	..	..	..	..	..	2	2	11	1	..	..	47.1	18.5	3.4	9.3	J. P Edwards.
ULVERSTON	11,000	34	20	6	2	..	2	7	3	..	..	..	..	..	..	..	..	5	1	..	2	37.6	22.1	0.0	5.5	A. Thompson, M.D.
WALKER-ON-TYNE	8,000	33	23	8	5	1	1	4	4	7	..	6	..	..	..	1	..	5	2	..	..	50.2	35.0	10.6	7.6	H. F. Hurst.
WALLASEY†	23,000	51	22	5	5	..	1	8	3	3	..	1	1	..	..	..	1	6	1	2	..	28.9	12.5	1.7	3.4	I. Byerley.
WARMINSTER	5,786	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	P. Grubb.
WARRINGTON†	40,000	134	58	12	12	5	3	16	10	3	..	1	2	..	..	..	..	10	2	4	7	43.7	18.9	1.0	3.3	I. H. Gornall.
WEDNESBURY†	26,000	66	35	13	6	3	3	5	5	7	..	..	3	..	2	1	1	4	..	2	..	33.1	17.5	3.5	2.0	J. C. Garman.
WEST BROMWICH†	54,000	179	99	25	15	*	*	*	22	12	..	..	2	..	..	5	5	*	..	5	4	43.2	23.9	2.9	*	J. Manley.
WEST DERBY	33,693	77	52	11	5	2	5	14	15	3	..	..	..	3	..	..	..	11	6	..	..	27.8	18.8	1.1	4.0	W. Carter, M.D.
WESTON-SUPER-MARE	14,000	20	17	3	..	..	1	6	7	1	..	..	..	..	..	..	1	1	2	..	..	17.4	14.8	0.9	0.9	C. V. Hitchins.
WEYMOUTH	15,269	17	12	1	1	..	..	4	6	..	..	..	..	..	..	..	..	3	3	..	2	13.5	9.6	0.0	2.4	H. Tizard, M.D.
WIDNES	22,000	89	38	11	4	..	1	11	11	1	..	..	..	..	..	..	..	18	2	3	..	49.2	21.0	0.6	10.0	W. Cooper.
WILLENHALL†	19,300	51	32	15	9	3	..	3	2	11	..	..	10	..	..	..	1	9	1	1	..	34.4	21.6	7.4	6.1	W. H. Hartill.
WITHINGTON†	15,000	26	26	4	4	4	4	4	6	4	..	1	1	1	..	1	..	6	2	..	..	22.6	22.6	3.5	5.2	T. C. Railton, M.B.
WOLBOROUGH	7,300	*	9	1	1	1	1	1	4	..	..	..	..	..	..	..	..	1	3	..	..	*	15.0	0.0	1.7	L. Armstrong.
WOLVERHAMPTON†	76,000	223	141	34	18	12	8	32	36	14	..	2	6	..	2	2	2	24	15	10	27	38.3	24.2	2.4	4.1	J. H. Love.
WOMBWELL†	7,500	19	17	*	*	*	*	*	*	5	..	..	2	..	1	1	1	..	..	1	..	33.0	29.6	8.7	0.0	J. N. Millar, M.B.
WORKINGTON	10,000	37	24	7	3	..	1	6	7	3	..	1	..	..	..	..	2	7	2	..	..	45.0	29.2	3.6	8.5	J. Ward, M.D.
WORTHING	9,540	39	13	2	2	..	2	4	3	4	..	..	..	..	..	4	..	1	1	..	..	49.7	16.6	5.1	1.3	C. Kelly, M.D.
YORK	46,850	126	75	11	8	4	6	24	22	14	..	2	3	1	3	4	1	17	4	3	4	35.1	19.5	3.6	4.4	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 20.73.

towns last month included 1673 which were referred to the seven principal zymotic diseases; of these, 613 resulted from scarlet fever, 249 from fever, principally enteric, 241 from measles, 225 from diarrhœa, 200 from whooping-cough, 92 from diphtheria, and 53 from small-pox. These 1673 deaths were equal to an annual rate of 2.9 per 1000 in the twenty towns during the four weeks under notice, against 7.8, 6.9, and 3.7, in the three preceding months; this marked decline was mainly due to the steady decrease of diarrhœa fatality. The zymotic death-rate last month was equal to 2.8 per 1000 in London, and averaged 3.0 in the nineteen provincial towns. The lowest annual death-rates from these seven diseases during November were 0.9 and 1.5 in Plymouth and Birmingham, while the rates ranged upwards in the other towns to 4.3 in Norwich, 5.7 in Salford, and 7.2 in Sunderland. Scarlet fever was the main cause of the high zymotic death-rate in Norwich and Sunderland, while the high rate in Salford was about equally due to the fatality of measles, scarlet fever, and enteric fever.

Scarlet fever was the most fatal zymotic disease in the twenty towns during last month, and its fatality showed a further increase upon that which prevailed in the two preceding months. The annual death-rate from this disease averaged 1.07 per 1,000 in the twenty towns in November, against 0.73 and 1.04 in September and October; the largest proportional fatality of scarlet fever during last month occurred in Oldham, Norwich, and Sunderland, and in the last mentioned town the annual death-rate from the disease was equal to 4.9 per 1,000. The 249 deaths from fever (mainly enteric or typhoid) in the twenty towns were equal to an annual rate of 0.43 per 1,000, which scarcely differed from the rates in the two preceding months; in London the rate from fever last month did not exceed 0.26, whereas it averaged 0.59 in the nineteen provincial towns. Fever was therefore more than twice as fatal during November in the large provincial towns as it was in London. The death-rate from measles last month showed a considerable further increase upon that which has prevailed during recent months; this disease was considerably more fatal in London than in the aggregate of the provincial towns, but showed the greatest fatality in Salford. The 225 deaths from diarrhœa exceeded the average number for the month; a similar excess of diarrhœa fatality occurred in the Scotch towns last month. The fatal cases of whooping-cough showed a further decline from recent monthly numbers; they were proportionally most numerous in Hull. The 92 deaths referred to diphtheria in the twenty towns included 54 in London and 38 in the nineteen provincial towns; of the latter, 9 occurred in Portsmouth, 8 in Liverpool, and 5 in Birmingham. Small-pox caused 53 more deaths in London (against but 21 and 20 in September and October), whereas no death from this disease was recorded in any of the nineteen provincial towns either in October or November. With reference to this marked increase of small-pox fatality in London it may be noted that the number of small-pox patients in the Metropolitan Asylum Hospitals, which had steadily declined from 216 to 95 in the four months ending September, rose successively to 105 and 210 at the end of October and November. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 15 and 20 respectively in September and October, further rose to 53 during November. This threatened revival of epidemic prevalence of small-pox in London was mainly confined to the east group of registration districts, among which Bethnal Green was the principal sufferer.

The fatality of diseases of the respiratory organs, influenced by short periods of unseasonably cold weather, showed a further marked increase during November. The average weekly number of deaths referred to these diseases in London, which had been 160 and 299 in September and October, further rose to 369 in November; this number was, however, 55 below the corrected average number in the corresponding month of the last ten years. The annual death-rate from these diseases last month was equal to 5.3 per 1,000 in London. The death-rate from lung diseases last month in those of the nineteen provincial towns for which the information is available ranged from 3.9 and 4.1 in Sunderland and Wolverhampton, to 7.4 and 7.9 in Liverpool and Salford.

In the outer ring of suburban districts around London, having a population of little less than a million persons, the annual death-rate from all causes during November did not exceed 16.8 per 1,000, against 17.9 and 15.5 in the two preceding months; and the zymotic death-rate, which had been equal to 5.7 and 2.1 in September and October, further declined to 1.6 per 1,000 last month. The rates from all causes, and from the seven principal zymotic diseases, in inner, or registration London, were, as before stated, 21.9 and 2.8 respectively during last month.

The accompanying table contains uniform November mortality statistics for 210 Urban Sanitary Districts, furnished by the local Medical Officers of Health. During the sixteen preceding months the number of contributing sanitary districts had steadily increased from 36 to 214. On the last day of November, 216 post cards were sent out to the Medical Officers of Health of as many Urban Sanitary Districts. We have been able to include in the accompanying table the mortality statistics relating to 210 of these sanitary districts. The estimated population of the 210 districts for which we publish November statistics is about seven and a half millions, and including London and its outer ring of suburban districts, the aggregate population dealt with is little short of 12 millions, and nearly half the entire population of England and Wales. The birth-rate in those districts furnishing this information averaged 34.4 per 1,000, against rates declining steadily from 37.7 to 32.5 in the five preceding months. Exceptionally low birth-rates (under 20 per 1,000) prevailed last month in Bethesda, Carnarvon, Liversedge, Weston-super-Mare, and Weymouth. Rates, on the other hand, exceeding 48 per 1000, were recorded in Burton-upon-Trent, Ilkeston, Mexborough, Rowley Regis, Runcorn, Swinton, Tottenham, Widnes, and Worthing. Some of these exceedingly high birth-rates are undoubtedly suggestive of an under-estimate of the present population of the sanitary districts. The approaching Census, however, will set these doubts at rest, and give a greatly increased value to local vital statistics.

The annual death-rate in the aggregate of the 210 sanitary districts averaged 21.4 per 1,000 of the estimated population, against 26.2 and 18.0 in the two preceding months. The average death-rate during last month in the twenty large towns, including London, was, as before stated, 22.2 per 1,000; the death-rate in the smaller towns was therefore again last month considerably below that which prevailed in the larger towns. Very low death-rates, under 11

per 1,000, prevailed during November in the following sanitary districts:—Banbury, Bromley (Kent), Nelson, Ovenden, Ramsgate, Rusholme, Teignmouth, Thornhill, and Weymouth. On the other hand, death-rates exceeding 32 per 1,000 were recorded in Ashton-under-Lyne, Neath, Nuneaton, Trowbridge, and Walker-on-Tyne. These high death-rates, excepting that in Nuneaton, appear to have been mainly due to exceptional zymotic fatality. The annual death-rate from the seven principal zymotic diseases in the 210 sanitary districts averaged 2.8 per 1,000, against 8.7 and 3.9 in the two preceding months, when the excess was caused by the great fatality of summer diarrhœa. Exclusive of diarrhœa, the rate from the six other zymotic diseases averaged 2.4 per 1,000, against 2.1 in October, the slight increase being due to scarlet fever; the fatality of these six zymotic diseases was, however, generally below the average. No death was referred during November to any of the seven zymotic diseases in 43 of the 210 sanitary districts; while an excessive zymotic death-rate, above 8 per 1,000, prevailed in Altrincham, Cockermouth, Neath, Rawmarsh, Trowbridge, Walker-on-Tyne, and Wombwell.

The fatal cases of scarlet fever showed a somewhat general increase upon the numbers returned in recent months, and showed a large proportional excess in Altrincham, Ashton-under-Lyne, Bolton, Crewe, Neath, Swansea, and Willenhall. Measles also showed an increased fatality during November, and prevailed with epidemic severity in Burslem, Merthyr Tydfil, Neath, and Trowbridge; in Trowbridge, of 43 deaths from all causes, no less than 31 were referred to measles, being equivalent to an annual rate of 27 per 1,000 living of the population. Whooping-cough fatality scarcely differed from that which prevailed in October. The deaths referred to this disease, however, showed a proportional excess in Barrow-in-Furness, Burslem, and Cardiff. The average death-rate from fever in the 210 sanitary districts showed a further increase upon that which has prevailed in recent months; it was markedly excessive in Cardiff, Crewe, Derby, Gorton, Huddersfield, Preston, Southport, West Bromwich, and Worthing. In Huddersfield no less than 31 deaths were referred to fever, principally enteric, against but one recorded in October; the fatal prevalence of this disease in Preston, although again considerable, showed a marked decline from that which was recorded in the preceding month. Diphtheria caused 4 deaths in Barrow-in-Furness, and 3 both in Aston Manor and West Derby. Diarrhœa showed, for the season, excessive fatality in Preston. Only 3 deaths from small-pox were recorded in the 210 sanitary districts; of these, one each occurred in Bury, Croydon, and Maidstone.

The annual death-rate from diseases of the respiratory organs, including phthisis, averaged 4.9 per 1,000 persons living in those sanitary districts for which this information is available, against 2.3, 2.5, and 3.5 in the three preceding months. The death-rate from lung diseases showed excessive fatality last month in Glossop, Louth, Tredegar, Widnes, and Workington.

Infant mortality, measured by the proportion of deaths under one year to births registered, showed a further considerable decline, and averaged 149 per 1,000, against 290 and 186 in September and October. In the twenty large towns the death-rate of infants averaged 146 per 1,000, against 276, 246, and 174 in the three preceding months. Infant mortality during November did not exceed 137 in London, while it averaged 155 in the nineteen provincial towns, among which it ranged from 112 and 121 in Plymouth and Newcastle, to 198 and 208 in Salford and Norwich. Among the smaller urban sanitary districts, infan mortality showed a proportionally large excess in Ashton-under-Lyne, Lincoln, Merthyr Tydfil, Middlesbrough, Preston, Southport, Tredegar, and Willenhall. The rate of infant mortality in Preston has shown a marked excess during the past five months; that in Merthyr Tydfil was due to exceptional fatality from measles.

The accompanying table of November statistics includes the following fifteen watering-places or health resorts:—Brighton, Dawlish, Dover, Eastbourne, Hastings, Ilfracombe, Little Hampton, Penzance, Ramsgate, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The usual returns from Bangor and Ryde have not come to hand. The annual death-rate in these fifteen watering-places during November averaged 18.1 per 1000, against 22.8 and 17.8 in the two preceding months; the zymotic death-rate did not exceed 1.8, and showed a further decline from that which prevailed in August, September, and October. The death-rate from diseases of the respiratory organs during last month, exclusive of Brighton, for which we do not receive this information, averaged 3.5 per 1,000, and was 1.4 below the average rate in all the sanitary districts. The only exceptions to the generally satisfactory evidence afforded by these statistics of the sanitary condition of the fifteen health resorts were the proportionally high death-rates from enteric fever in Southport and Worthing.

Our thanks are once more due to contributing Medical Officers of Health for the punctual dispatch of their cards of mortality statistics, especially to the 77 whose cards were received on or before the 4th inst., which afforded material assistance in facilitating the labour of preparing the table for publication.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BIRMINGHAM.—Sanitary work continues to make rapid progress in Birmingham. During 1879 it was carried on with undiminished activity, as many as 15,023 notices having been served on property owners for the abatement of nuisances. The borough infectious hospital received 184 cases of scarlatina and one of small-pox during the year. 4387 articles were disinfected, and 71 bodies removed to the five mortuaries of the town. The city water-supply continues to improve in quality, and a large number of private wells were closed. Six-and-a-half miles of sewers were constructed during the year, and 3,055 pans substituted for midden privies. These figures all testify to the sanitary progress which is being manifested at Birmingham; and a further proof of the improved condition of the town is to be found in the diminished death-rate, which was 21.82 in 1879, against 25.2, 23.9, and 22.4 in the three preceding years. The infantile death-rate showed a satisfactory reduction, though, as compared with other towns, the proportion is still high. Zymotic diseases caused in all 1254 deaths, against 2421 in 1878, and an average of 1576 for the four years 1875-7. The most fatal of these diseases was whooping-cough, which was responsible for 384 deaths. The

deaths from scarlatina, diarrhœa, fever, and diphtheria all show a decrease on those for 1878, whilst measles, which commenced to be epidemic at the end of the year, shows an increase. In speaking of the deaths from diphtheria and fevers, Dr. Hill says that 70 per cent. of the former and 50 per cent. of the latter were associated with drainage defects and excrementitious animal filth on the surface.

CAMBRIDGE.—Dr. Bushell Anningson's fifth report on his work at Cambridge is not without its interest, though the progress he records seems to be unduly slow. A disinfecting oven was indeed set up during 1879, certain polluted wells were closed, and structural alterations were made in a number of waste-pipes and house-drains; but, with regard to the general supervision of the town, Dr. Anningson repeats his words of last year, 'that the results are not so satisfactory as could be wished'. A large number of orders were issued for the sanitary amendment of houses and premises, besides the ordinary nuisance orders; but the unhealthy crowded dwellings of Cambridge constitute a serious difficulty in the path of sanitary reform there. Unless the powers of the Artizans' Dwellings Act are set in motion at once and energetically, there seems no effectual remedy for this great slur upon the town. The mortality of last year shows an improvement over that for 1878, the total number of deaths being 611, or 51 fewer than in 1878. Zymotic diseases declined considerably, summer diarrhœa being almost wholly absent. Enteric fever caused six deaths, as against 12 in 1878. Scarlatina was somewhat more fatal than usual; but diseases of the respiratory organs showed a continued increase upon the two or three preceding years. The general death-rate was 18.0 per 1000, and the birth-rate 27.0 per 1000.

CARNARVONSHIRE. — It is satisfactory to have from Dr. Rees so good an account of sanitary work in this county. With but one or two exceptions, the Authorities in the combination all seem to appreciate their responsibilities, and several of them are working most energetically in improving their districts. Vested interests seem to stand in the way of certain very desirable undertakings; but even here difficulties are being surmounted and improvements effected. The quarry villages seem to constitute one of the most serious obstacles to the sanitary progress of the district, since there are great arrears of long standing to make up. The health of the district, as evidenced by the general death-rate and the mortality from zymotic diseases, is improving. In 1879, the death-rate was 20.3 per 1000, or 1.4 less than in 1878. The infantile mortality, though still too high, improves every year; and the deaths from zymotic diseases, which in 1877 numbered 389, fell to 321 in 1878, and 211 in 1879. Scarlatina seems to have been seriously prevalent in certain localities, and diphtheria was epidemic in several small villages. Investigation by Dr. Rees, though supplemented by inquiry by Dr. Airy of the Local Government Board, failed to bring out any satisfactory explanation of the causation of these latter epidemics—a result greatly to be deplored. We would suggest to Dr. Rees whether he could not advantageously extend the tabular statements appended to his report. At present he has but one, and that of a somewhat confusing kind. A few tables based on the model of those referred to on page 116 of Vol. x of this Journal would prove a very acceptable addition to the report, and make the text a good deal clearer.

DRAYTON RURAL.—Dr. Sandford's report is brief, and consists mainly of comments on the mortality statistics. He records a general death-rate of 17.22 per 1000, but whether or not this is an improvement is not stated. Measles was prevalent in many of the parishes of the district, four deaths being ascribed to it. No deaths from continued fevers were registered during the year. Of the 258 deaths, 56 were of children under five years of age. At the other extreme of life, 29 deaths were registered from old age, one woman dying at the age of 91 years, and a man (her husband) at the age of 95. Dr. Sandford reports with satisfaction that the general supply of potable water has been much increased in quantity and improved in quality.

DROITWICH RURAL.—The statistics of this district show that during 1879 the birth-rate slightly decreased (from 34.0 to 32.8 per 1000), and the death-rate increased from 15.01 per 1000 in 1878 to 18.31 in 1879. This was mainly due to the very cold spring and winter, as well as the continued wet. The infantile death-rate was higher than in the two former years, but the deaths over 60 showed a great increase, whilst the deaths between the ages of 5 and 60 were only 88, showing a death-rate of 5.04. The zymotic death-rate was lower than it had been during the previous four years, scarlatina having much decreased. No epidemic occurred throughout the district, the cases of zymotic disease being nearly all isolated cases, some of whom came home from service, having contracted the disease out of the district. There is less overcrowding and dilapidation in the houses of the poor than formerly. Claines, a suburb of Worcester, which is rapidly growing up without adequate sanitary regulation, continues to be a constant source of anxiety. Dr. Swete states that in many cases the drainage (such as it is) of the new houses that are being hastily run up there, has been choked, and has required the interference of the Inspector before the houses had been occupied three months! Appended to the report is one on the burial grounds of the district, which calls for no comment.

GLASGOW.—Dr. Russell's quarterly reports necessarily detract somewhat from the interest of his annual report, which consists exclusively of statistics. The meteorological and vital characteristics of Glasgow in 1879 were a low temperature, high summer but low total rainfall, and a diminished death-rate, especially among children. The general death-rate was 23 per 1,000, the birth-rate 37 per 1,000. The deaths under five years amounted to 42 per cent. of the total deaths. The deaths under one year constituted 13 per cent. of the births, and in only 77 per cent. of them was the cause medically certified. The lives of 22.5 per cent. of the infants thus dying were insured in Friendly Societies, a proportion which can hardly be regarded with perfect comfort in view of the high child mortality. The fact of children by their death bringing a sum of money in excess of the necessities of their burial into the hands of their guardians must be regarded with strong suspicion, especially in those cases where the death is not medically certified. The comparison of last year with the average of the six preceding years shows an improvement all round, but chiefly in the fatality of zymotic diseases. The epidemic of 1879, as of the preceding year, was whooping-cough, which alone caused 482 deaths. The fevers were never so slightly fatal; since 1869, the death-rate from these diseases has fallen year by year, with a trifling check in 1875. The number of deaths due to them last year was 198. Scarlatina caused 248, measles 156, and diphtheria 126 deaths.

LIVERPOOL.—A report on a huge district like this, with its 20,844 births and 14,502 deaths in 1879, must needs have a special value. Especially as regards zymotic diseases are Dr. Stopford Taylor's figures of interest. Typhus, from which Liverpool has suffered so much, continues to decline, and Dr. Taylor confidently hopes that it will shortly become a disease of comparatively rare occurrence. The deaths from other forms of fever also show a decrease. Scarlatina was prevalent during the year, and caused 734 deaths, or 16 more than the average of the last ten years. In too many instances the non-removal of the first case to hospital caused the loss of two or three children in the same family, and very frequently the mothers were also sacrificed. Measles was more fatal than usual, owing to the complications arising from the cold in the last quarter of the year, when 321 deaths from this disease occurred out of 445 for the whole year. An idea of the work of the Health Department with regard to infectious disease may be gleaned from the fact that 3,857 cases were reported, 710 patients removed to hospital, 1,855 post-cards sent to school-masters as to children from infected schools, 2,170 houses disinfected, and 35,054 articles sent to the disinfecting apparatus. The deaths of children under five years of age amounted to 43.8 per cent., and of children under one year to 16.4 per cent. of the total deaths. The details given of sanitary work are very full, and show how much need there is of ceaseless activity in order to adequately maintain the sanitary well-being of so enormous a congregation of persons as Liverpool. The general birth- and death-rates of the city for 1879 were equal to 38.7 and 26.9 per 1,000 respectively.

MERTHYR TYDVIL.—The reports on the health of this town now form quite a long series, the report for 1879 being the fifteenth annual volume that has been presented to the Local Board. It records steady progress against somewhat serious odds. The general death-rate was 20.5 per 1000, which is, with one exception, the lowest recorded. The deaths of 221 children under one year of age were registered, or 21.5 per cent of the total deaths, which numbered 1036. The proportion to the total mortality of the deaths of children under five years was 32.7 per cent., a marked improvement on the figures for former years. There was almost complete immunity from any widespread diffusion of zymotic diseases. Measles, scarlet fever, and diphtheria each caused one death, and 13 more were due to whooping-cough. The deaths from enteric fever were 20 in number: and Mr. Dyke records that in every instance when a case of this disease was observed, there was found in the immediate vicinity of the dwelling either an imperfect drain-pipe, a broken gully-trap, a broken or ill-fitting closet-syphon, or a foul cess-pit. The description given by the Medical Officer of the condition of some parts of the district shows very forcibly how much work still lies before the local authority.

MIDDLESEX AND HERTFORDSHIRE.—The districts in these counties served by Dr. C. E. Saunders have happily a very uneventful sanitary history. The most pressing want of all of them seems to be a sufficient supply of pure water—for this subject is continually cropping up in Dr. Saunders' report. In certain parts of the district, moreover, the system of excrement removal requires radical alteration. Considering the nearness of the district to London, and the consequent risk of the importation into it of infectious disease, it is disappointing to find so little has been done to provide hospital accommodation. Amongst the population of 97,606 persons in the district, there were 1593 deaths last year, giving a death-rate of 16.3 per 1000. The number of deaths under one year of age has diminished, these being 20.3 per cent. of the total deaths. Zymotic diseases caused 6.2 per cent. of the total deaths; but none of such diseases assumed the dimensions of an epidemic. Outbreaks of diphtheria at Friern Barnet, of scarlet fever at Bushey and Harrow station, and of measles at Croxley Green, constitute all which it seems needful to mention.

PRESTON.—The mortality of this town cannot but be considered excessive when it is at the rate of 27.34 per 1000, even if this be an improvement of 1.32 on the figures for 1878. The infantile mortality is large, constituting 27.81 per cent. of the total deaths; and the subject seems one to merit the particular attention of the local sanitary and charitable authorities. The custom of mothers working in the factories undoubtedly tends here, as elsewhere, to swell the infantile death-rate. The most serious zymotic disease of the year was scarlatina, which destroyed 137 lives—nearly all of young children—as against 163 in 1878. The total number of deaths from zymotic diseases was 283, the typhoid fever figures showing a very gratifying decrease. As might have been anticipated from the weather, the mortality from diseases of the respiratory organs was enormously high, 398 persons succumbing to bronchitis alone. Progress seems to be making in the abolition of the enormous stores of excrement that used to characterise the place. In some of the confined courts and squares, Macfarlane's large trough-closets have replaced the central stacks of privies that were so unsightly and dangerous a nuisance. A number of cellar dwellings have been closed, the ventilation of the larger drains attended to, a large amount of disinfection effected, an ambulance purchased; and in other respects the sanitary state of the district seems to be well looked after. Mr. Pilkington anticipates much advantage from the local Act, providing for the compulsory notification of infectious diseases, which, he thinks, 'cannot fail to be of service, by giving timely warning of the appearance of any infectious malady'.

ST. ASAPH RURAL.—This is an unusually good report in many respects, giving a large amount of information within a small compass. One instance of bad and inefficient sewerage work which Dr. Lloyd Roberts records is really so scandalous, that we think some inquiry ought to be made as to how the defects reported by the Medical Officer can possibly have been allowed to arise, without someone being made responsible for them. We regret to say that it is by no means uncommon for us to hear of works of sewerage being discredited, and money wasted, through the knavery of contractors or the inefficient supervision exercised over them. At St. Asaph, much sanitary work was done during the year, including the substitution of water closets for cesspits at the national schools. The class of nuisances that have now become prominent by the removal of the grosser ones are those arising from accumulations in farm-yards and of house refuse. Both of these can be obviated, or at least modified, by care and attention. The Sanitary Authority seem to have a good many structural works of drainage and water-supply on their hands, whilst others are still 'under consideration'. Last year the general death-rate of the district was 22.6 per 1000; but although the reason for this large figure may be partly guessed, it is not explained in the report. The zymotic diseases which had the

greatest and most fatal prevalence were scarlatina, whooping-cough, and diphtheria. Some very interesting cases from an etiological point of view are given in this report, but no very definite conclusions can be drawn from them.

SAMFORD RURAL.—Mr. Elliston's report contains a feature which might well be generally copied—statistics for the district for ten complete years, so that the figures of each year can be compared with those of the others. The birth-rate was under the average of the previous nine years, and the death-rate slightly above it. The increase in the mortality was due to the high death-rate among elderly persons, from diseases of the respiratory organs, during the first six months of the year. The deaths numbered 224, or 22 more than in 1878, and eight above the average. These deaths give a death-rate of 18.0 per 1000. Eleven persons died from zymotic diseases, against 21 in 1878. This number is the smallest on record, and is 15 under the average. The infantile mortality was in excess of any of the previous nine years, 70 deaths occurring in children under five years. The amount of sanitary work carried out was somewhat less than in previous years. The great want of the district seems to be better and purer water-supply, and there seem to be difficulties in procuring this which Mr. Brown's Water Act can only partially overcome.

SOUTH SHIELDS.—This report is the last that Mr. John Spear presented before his appointment as medical inspector of the Local Government Board. It fully bears out Mr. Spear's reputation as a reporter and as a hard sanitary worker. In almost all departments, improvements would appear to have been made under his guidance: and it is to be hoped that, now that he has gone, the Sanitary Authority will not recede from its former attitude of progress. During last year, there were 2217 births and 1214 deaths in the borough. The birth-rate, calculated on the estimated population of 62,000, was 35.8, or 2.4 below the rate for 1878. The death-rate was 19.6 per 1000, the lowest rate for South Shields on record. The deaths of infants under one year constituted 23.3 per cent., of children under five years, 48 per cent., and of people aged sixty and upwards, 16 per cent. of the total deaths. In the infantile mortality of the district there appears to be a continuous decline, the rate for last year being much below the average. As in 1878, scarlatina was by far the most fatal of the infectious diseases: the deaths from that cause accounting for fifty per cent. of the total zymotic deaths. The disease, which has now been epidemic for two years, attacked some 400 persons last year, but is reported to be on the decline. The influence of the public day-schools in the dissemination of the fever poison has been very apparent, and the congregation of neighbours in fever-stricken houses for sympathy or gossip is also a most fertile source of mischief. Mr. Spear apparently had no hope of making much headway against the epidemic in the absence of hospital accommodation, of a system of compulsory registration of diseases, and of increased statutory powers for preventing the spread of infection. The death-rate from the continued fevers shows a steady and continuous decline. In 1878, the fever-rate for South Shields was the lowest on record; in 1879 the decline was still more marked. The deaths from diarrhœa were much below the average, amounting only to 33.

STURMINSTER RURAL.—Solid though unpretending sanitary work is evidently being done in this district under the guidance of Dr. Comyns Leach. There is still, however, a good deal to be done, especially in the drainage and ventilation of dwellings, and in improved cottage accommodation. The present defective state of these latter in the district has no doubt to answer for at least part of the serious mortality from consumption, which occasioned 19 out of the 65 deaths between the ages of five and sixty. The general death-rate was 15.7 per 1000, which compares very favourably with the average of the four preceding years—nearly 18 per 1000. Zymotic diseases were almost entirely absent: one fatal case of whooping-cough and two of diarrhœa representing the whole of the deaths from this group of diseases. The infantile mortality was satisfactorily low, being at the rate of 86 per 1000 births.

WALSALL.—The report of Dr. Maclachlan is extremely brief, and gives but very few particulars as to the sanitary progress of this large district. The death-rate is given as 22.22, as against 22.11 in 1878; but 'the figures have not been corrected by the reduction of the number of deaths occurring in the public institutions of the borough'. Of the 1289 deaths, 170 were from zymotic diseases, as against 250 for 1878. This decrease is principally due to the abatement of the scarlet fever epidemic, and in a lesser degree, to fewer deaths from typhoid fever and diarrhœa. Although 90 deaths were recorded from scarlatina in 1879, and 156 in 1878, the infectious hospital was not opened, a proceeding which is in itself not a little extraordinary. There was a remarkable decrease in the number of deaths from diarrhœa, probably due to the comparatively low temperature of the summer. It is satisfactory to find that the death-rate from typhoid continues to decrease, the number of deaths being reduced from 19 in 1878 to 12 in 1879. The appended reports of the Inspectors of Nuisances show that ordinary sanitary work is being carried on with activity in the borough.

WEST KENT.— Dr. Baylis records for 1879 a very satisfactory decrease in the death-rate of this district, and in the fatality of zymotic disease. The total number of deaths was 2549, or 79 less than the average, and the number of zymotic deaths was 265, or no less than 145 under the average. This gratifying result has no doubt been largely due to the progress which is yearly being made in the sanitary improvement of the district, nuisances being repressed in large numbers, and important works of drainage having been undertaken. The infantile mortality was somewhat larger than usual, but the proportion of the deaths under one year to the registered births (116 per 1000) is not excessive. Small-pox was, as usual, imported into the district from London on several occasions; but the disease was in each instance confined to those attacked or already infected at the time of its discovery. Measles (24 deaths), scarlatina (17), diphtheria (21), and fevers (21 deaths) all show a decreased mortality as compared with former years; but whooping-cough (74 deaths) shows an excess of 18 deaths over the average. An interesting account is given of a severe household epidemic of diphtheria at Trottescliffe, which killed seven persons in a family within the space of a few weeks. To the combination the Local Board of Southborough has now joined itself, and it is to be hoped that the other districts locally situated in the district, but not in the combination (viz., Maidstone, Wrotham, and Tunbridge Wells), may soon follow its example.

WOKINGHAM URBAN AND RURAL.—Dr. Shea's reports on these districts call for no special comment. They record substantial work in the direction of the repressing of ordinary nuisances, though certain large

questions, as, *e.g.*, the diversion of the sewage from the Thames, still stand over. The death-rate for the rural district was 17 per 1000, a considerable increase on the rates for 1877 and 1878. Only five fatal cases of zymotic disease were recorded during the year; but the general death-rate was raised by the undue fatality of pulmonary affections. A large share of Dr. Shea's time seems to have been devoted to the water-supply of the district, and to the analysis of samples. Evidently there is much room in the district for the operations of the Water Act of 1878. In the Wokingham urban district the death-rate (calculated, it must be premised on very small figures) was 20.6 per 1000. Only three deaths were registered from zymotic diseases, and the bulk of the mortality was due to 26 cases of fatal lung and heart disease, together with 55 from other causes. The drainage and refuse removal of the town seem to need further attention, but the new waterworks are making satisfactory progress.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

THE last meeting of this Society was held on Friday, November 19th, Dr. Bristowe, President, in the chair. The Council brought up a report on the publication of the results of the water analysis, hitherto made on behalf of the Society, recommending that a vote of thanks be passed to Dr. Tidy for his services in making the analyses for many years past, and that he be informed that the Society does not consider it necessary that they should be continued. That the price of the Society's *Transactions* for the past year be 3s. 6d., and that the printer be the publisher also. They also reported that they were not able at present to decide on the best means of collecting and removing animal and vegetable refuse from the places where they are deposited, or of its ultimate disposal. A rather long discussion ensued on this subject, when it was decided to withdraw the reference to the Council and to appoint a special committee for the purpose of considering and reporting upon the whole subject, including the most modern means for carrying out their destruction. Dr. Saunders then moved that the collection and removal of house refuse be included in the reference. This having been agreed to, the following members and associates were elected, viz.: Drs. Saunders, Wynter Blyth, A. Carpenter, Dudfield, and Mr. Murphy, one of the secretaries. The following gentlemen were elected, viz.:—Dr. Collingridge, the Medical Officer of Health for the port of London, as a Metropolitan member; Mr. Morcom, Medical Officer of Health for Luton Rural Sanitary District; and Dr. Rowland, Medical Officer of Health for Richmond, Surrey, as extra Metropolitan members. Mr. Cosmo Innes, M.I.C.E., Dr. J. Symons, Hackney, and Mr. W. Kemp, Camberwell, were elected associates. Dr. Vinen then reported that Dr. Billings had forwarded several pamphlets from New York, for which a vote of thanks was passed. Dr. Ogle, the Deputy Registrar-General, and Sir Alexander Armstrong, Inspector-General (Naval department), were nominated by Dr. Bristowe and Dr. Tripe as honorary members, and Mr. Wareham, Medical Officer of Health, as an extra Metropolitan member. Mr. Lovett then said that the remarks which he proposed making on a communication from the Charity Organisation, on the subject of the dwellings of the poor, were not requisite now, and he proposed that it be simply referred to the Council, which was agreed to.

Dr. Tripe then read his paper on 'The Action of Disinfectants on Sewage, and the Living Organisms contained therein'. Before beginning his paper, which will be found at page 201, he handed round a sheet of well drawn microscopic illustrations of the micrococci, bacteria, bacillus, vibrios, spirilla, monadina, and various forms of infusoria met with during his investigations. Also a singularly well-drawn group of mycelium and spores.

Dr. Baxter began the discussion by saying that it was very difficult to follow a number of facts such as those just submitted by Dr. Tripe. He knew from his own experience the great labour of carrying out such experiments. He was somewhat struck with the statement of the deodorant effects of No. 5 acid, which is an impure carbolic acid, and has a greater germicide power than pure acid when used in the same proportion. He regretted the application of the name 'disinfectant' to many of the substances used. He mentioned the great difficulty of applying the microscope to these forms of life, as a large proportion are extremely minute, and referred to a particular mode of manipulation by which a single organism can be kept under observation for some time. He thought the test of inoculation should be applied with infective fluids in addition to the microscopic examination. He then opened the subject of the advisability or usefulness of disinfection, as infective matter is destroyed by putrefaction, and therefore, in his opinion, anything which retards putrefaction may be injurious. He thought this part of the subject should be fully considered.

Dr. Alfred Carpenter was of opinion that fresh sewage is not injurious, and that it should therefore be conveyed away before decomposition or putrefaction set in. He agreed with the statement that putrefaction eventually destroys infection, but thought injury often results during the process, and illustrated an outbreak of fever which occurred some distance below Croydon, from disinfected sewage. Mr. Wynter Blyth believed that some putrefactive action must take place before typhoid fever could be communicated by excreta, and cited Dr. Budd's opinion in support. He therefore considered disinfectants useful. He did not think that putrefaction destroyed the poison of typhoid fever. Dr. Buchanan thought that the word 'disinfectant' should be synonymous with 'germicide'. He believed that putrefaction destroys infective matter. Dr. Tripe, in reply, said that whilst he agreed with the other speakers that putrefaction destroys the effectiveness of most zymotic and septic poisons, yet he did not believe it did so until a certain point was reached; and that, therefore, disinfectants, even some non-germicides, are useful in preventing putrefaction for a time, until most probably the infective matter had been removed by water carriage or otherwise to places where it would be destroyed innocuously. He instanced the power of carbolic acid to suspend infection, as shown by the experiments made with it on vaccine lymph, when the lymph soon after its admixture was non-infectious, but after a time resumed its activity by exposure to the air and consequent evaporation of the acid. He read a passage from a paper in the last volume of the Society's *Transactions*, showing that he thought the term disinfectant should be restricted to substances which can destroy infection.

THE PREVENTION OF SMOKE AND THE DIMINUTION OF FOG IN GREAT CITIES.

A FIFTH meeting of the Fog and Smoke Committee of the National Health and Kyrle Societies was held on Wednesday, November 17th, at 44, Berners Street. Among those present were Mr. Ernest Hart (in the chair), Mr. D. H. Macfarlane, M.P., Captain Galton, C.B., F.R.S., Mr. Chadwick, C.B., Mr. Flannery, M.E., Mr. W. R. E. Coles, C.E., Mr. J. L. Whittle, Mr. Mosely, Mr. Saxon Snell, Mr. Ernest Turner, Lady Harberton, Miss Octavia Hill, etc., etc.

The CHAIRMAN stated that he had to report that he had attended at South Kensington Museum on Saturday last, in company with Professor Chandler Roberts, and had an interview with Colonel Festing on the subject of an exhibition of grates, coals and smoke-consuming apparatus, with a view to trials made under the supervision of experts. Nothing definite had yet been settled on the subject, as it was found they would have to apply to the Commissioners of 1862 with respect to the buildings required for the purpose. Colonel Festing was of opinion that the subject was one which would be favourably regarded by the Commissioners and his own authorities; he personally would render every assistance in his power, and he had little doubt, when the matter came to be officially considered, that the Committee would get what they required. The exhibition was proposed to be one of apparatuses both for private and manufacturing purposes, and should also include different kinds of coal, accompanied by descriptive statements, the accuracy of which could be tested by a series of trials. He further reported that he had received a letter from Mr. B. J. Thomas, Secretary to the South Wales Colliery proprietors, enclosing a number of resolutions which were passed at a meeting of their body held at Swansea, on Nov. 12th, from which it was announced that they agreed to place at the service of the Committee, four truck loads of anthracite coal, containing ten tons each, for the purpose of trials, to be forwarded to Kensington and Maiden Lane stations. This class of coal could be supplied to the public at 18s. per ton at either of the above stations. The cost of delivery from the station, would be about 3s. per ton. A further resolution of this meeting was that they fully recognised the exertions now being made by the National Health Society for suggesting means for doing away with this great and increasing evil, and would gladly give all the assistance in their power for effecting the object in view. The Chairman stated that the experiments at South Kensington would not be confined to smokeless coal, but to ordinary coal and smoke-consuming apparatus. Smokeless coal was but one branch of the means for avoiding smoke. A circular inviting the attendance of manufacturers to the Conference to be held at the Cannon Street Hotel on the 25th instant, was put before the meeting and approved.

The CHAIRMAN reported that he had received a great deal of additional correspondence, which, so far as it related to suggestions, would be referred to the Sub-committee of Experts. It included communications from Dr. Humphry Sandwith, C.B., Mr. Anstie, and a number of other gentlemen.

With respect to the present carrying out of the law, the CHAIRMAN stated that orders had been given to the police to issue two notices instead of one before taking proceeding. There had been some thousands of convictions during the past ten years, with an average fine of 30s. only, which was not of sufficiently large amount to abate the nuisance.

In accordance with a resolution passed at the previous meeting, a letter, which it was proposed to send to the various Vestries and District Boards of the metropolis, was read, of which the following is a copy:—

SMOKE PREVENTION COMMITTEE OF THE NATIONAL HEALTH AND KYRLE SOCIETIES.

At the last meeting of this Committee it was resolved to appeal to your Board, and to other metropolitan vestries, to assist this Committee in the efforts which it is making towards preventing the excessive production of smoke in London.

This Committee has had its attention called to the comparative infrequency with which the provisions of the 19th section of the Sanitary Act, 1866, for the removal of nuisances, are put into force within the metropolis. The sub-section referred to is No. 3, the wording of which is as follows:—

The word nuisance shall include—'3. Any fireplace or furnace which does not, as far as practicable, consume the smoke arising from the combustible used in such fireplace or furnace, and is used within the district of a nuisance authority for working engines by steam, or in any mill, factory, dyehouse, brewery, bakehouse, or gaswork, or in any manufactory or trade process whatsoever. Any chimney (not being the chimney of a private dwelling house) sending forth black smoke in such quantity as to be a nuisance.'

The Committee trust that you will direct the attention of your Medical Officer of Health to these important provisions, in the hope that he will materially help the police authorities in their efforts to prevent the evolution of black smoke from fireplaces or furnaces, and thus assist in purifying the atmosphere of the metropolis.

The Committee will feel greatly indebted to you for any information as to your present or future action in this matter, and for any assistance derivable from independent local action, that your Board may think it well to take. At a later stage the Committee propose to apply to the Home Secretary for amendments in the law, with the view of making it more stringent and more generally applicable, and on this head also they will be much obliged for any suggestions or statements of opinion of your Board, feeling sure that in this matter we have your sympathy, and may hope to have your valuable and important aid.

I have the honour to be, sir,

Your faithful servant,

ERNEST HART,

Chairman of Council of National Health Society.

In discussing the question of finance, Captain GALTON was of opinion that the trials at South Kensington would involve considerable expense; and, judging from what had been the outlay with the Society of Arts on a like occasion, he thought they would require £500 or £600.

It was suggested by Mr. SNELL that manufacturers would gladly defray the cost of testing their own grates in this instance, as at the Sanitary Institute.

The CHAIRMAN stated that they would probably require £300 or £400.

MISS OCTAVIA HILL and Mr. W. R. E. COLES thought there would be little difficulty in raising the required sum if the public were appealed to at the present stage.

A deputation of the South Wales Anthracite Colliery Proprietors, etc., now attended before the Committee, and consisted of Mr. David Bevan, Neath; Mr. J. Kempthorne, Neath; Mr. B. H. Thomas, Neath; Mr. Owen Thomas, Neath; Mr. Perkins, Swansea; Mr. Cotton, Swansea; Mr. David Lloyd, Llanelly; Mr. Alpheus Smith, London; Mr. F. Cleeves, Rotherham, etc.

The CHAIRMAN stated that the information with which the Committee desired the deputation to favour them was, statements of the best description of smokeless coal, of the resources of their districts, and the probable range of prices.

Mr. BEVAN said, as regards factories and large works where large quantities of smoke were emitted, he would suggest an apparatus which could be applied to any boiler at a cost of 40s.; he had had it in use for some years, and it had proved highly successful. A detailed description, with plan, was put before the Committee, and it was decided to refer it to the consideration of the Expert Committee.

Mr. PERKINS (Swansea), making a statement on the resources of anthracite coal, and probable range of prices, said: The anthracite district was divided into two parts. The Pembrokeshire coal field, which was exclusively anthracite of the purest description, extended over a distance of twenty miles in length by five in breadth, *i. e.*, about 100 square miles, in which it was computed there were 215 millions of tons of workable coals. The other field ran east from the shores of Carmarthen Bay, about thirty miles, to the Neath fields. It merged into steam, and then into bituminous coal, and, therefore, was difficult to gauge exactly, but the nearest calculation they could arrive at was that, in a district thirty miles long by six in breadth, *i. e.*, 18,059 miles and 115,200 acres, they might reckon on a yield of 35,000 tons per acre, or a total in the district of 4,000 millions of tons. The anthracite formed only a small portion of the smokeless coal, as, according to Mr. Foster Brown, the anthracitous coals extended over 400 square miles. Amongst the well-known firms who had used anthracite coals for thirty years past were Messrs. Hall and Son and Messrs. Pigou and Wilks, the gunpowder manufacturers, who stated there was a saving of 25 per cent. upon them. They were exclusively burned in South Wales, and the only apparent reason for their not having come into more general use in factories in England was that there was some little difficulty in the stoking.

The price of this coal at the pit's mouth was generally 7s. to 8s. per ton, the cost of transit to London, 9s. 10d. per ton. It was very hard and difficult to break.

Capt. GALTON put the question whether it was customary to deliver the coal in certain sizes to meet the purposes for which it was to be used.

Mr. PERKINS stated it was not, but they could meet the wishes of the Committee in that respect.

Mr. W. R. E. COLES stated that coal, as delivered at Maiden Lane and Kensington, could be sold of the required size at 18s. 10d. per ton.

In reply to questions from the Chairman and others, Mr. ALPHEUS SMITH stated that the price of anthracite coal at the pit's mouth was about the same price as bituminous coal; and that it could be delivered at houses in London at the same price as paid for bituminous coals – 22s.—whilst there would be a saving of 25 per cent. by the burning the anthracite coal.

Mr. BEVAN said forty years ago there had been the same difficulty attending the introduction of steam coals, which were then only used for lime burning, but the time had now arrived when they could hardly raise sufficient of it.

In reply to questions put, it was stated that there was no fear of anything more than a temporary rise beyond the stated prices. The price would be regulated by the consumption, as with the bituminous coal.

Mr. LLOYD stated, in reply to a question from the Chairman, that the anthracite coal was 'fiery', and the same amount of danger to human life attended the working of this as of the bituminous coal.

Mr. BEVAN observed that this coal did not throw off noxious vapours to the extent of the ordinary coal. It did not give a great deal of dust, but broke up into cubes. There was very little ash attending the use of it.

Mr. PERKINS stated that the deputation had approved of the rules for burning smokeless coal which had been drawn up by the Committee, but suggested a less technical word than 'blower'.

Mr. BEVAN stated he had a model of a grate for the use of domestic purposes which he should be glad to submit to their notice. It was decided to bring it before the meeting on the 25th inst. at the Cannon Street Hotel.

A Conference of the Fog and Smoke Committee of the National Health and Kyrle Societies, with manufacturers and other large consumers of coal, was held at Cannon Street Hotel on Thursday, November 25th, for the purpose of obtaining their alliance with the Committee in their efforts directed towards the prevention of the production of London smoke. The meeting was very largely attended, and the manufacturing interest well represented: among those present were Mr. Ernest Hart, in the Chair, Capt. Galton, C.B., Commander Jas. D. Curtis, Mr. McCulloch, R.N., Dr. P. Hinckes Bird, Mr. J. F. Flannery, M.E., Mr. W. R. E. Coles, C.E., Mr. J. L. Whittle, Mr. B. Mosely, Mr. Clay, Mr. C. H. Perkins (Swansea), Mr. David Bevan (Neath), Mr. Foley (Rugeley), Mr. C. F. Hengst, Mr. F. W. Cotton, Miss Octavia Hill, etc., etc.

Communications were read from many gentlemen expressive of their great interest in the movement, and regretting their inability to attend.

The CHAIRMAN said that it was especially to be desired that the objects of the Committee should be carried out with the least possible friction, and with the largest possible assistance from the manufacturing interests concerned in this question. This Conference had been arranged with a view of enabling those manufacturers who were large consumers of coal, and at present large producers of smoke, to be adequately represented. The Committee proposed to undertake trials of various descriptions of fuel and apparatus, for the purpose of lessening the generation of smoke. These trials would necessarily be most beneficial in effecting the better utilisation of coal as a motive power, and therefore in securing an important advantage to the consumers of coal. At present there was a great loss of coal by the way in which it was consumed; Sir Francis Knollys' estimate being that out of 5,000,000 tons annually consumed in London, between 2,000,000 tons and 3,000,000 tons were wasted in smoke or gas. As one remedy for this evil, it was suggested to use a mixture of bituminous and anthracite coal. This had been done in the Royal Navy, and a saving of £100,000 a year effected. The Committee had practically arranged a series of trials of fuel and apparatus at South Kensington Museum, and they there proposed to test the various kinds of smokeless coal and fuel. They would have, for the purpose of making the various experiments, an amount of space in the Horticultural Society's buildings, and also one of the annexes of the Museum, by permission of the Commissioners of 1862. A Committee of Experts had been appointed, and it was to be desired that some gentlemen representing the manufacturing interests would add their

names to those already given. The Committee of Experts included Captain Douglas Galton, Professor W. Chandler Roberts, Mr. J. Lowry Whittle, Mr. William Eassie, C.E., Mr. E. Chadwick, C.B., Mr. A. T. Atchison, M.A., Mr. W. R. E. Coles, and Mr. J. F. Flannery, M.E. Funds would be required to carry out the trials, the result of which would be of the utmost importance to the public. To do this work adequately the sum of £1,000 or £1,500 would be required, not merely for the South Kensington trials, but for practical experiments on steam boilers in use in manufactories, and he should suggest that Sir Edmund Hay Currie, who had given his support in the matter, should be asked to act as one of the joint Treasurers.

Mr. W. R. E. COLES said he had a great deal of sympathy with what was practically the better utilisation of coal, and he hoped that before the conference closed, manufacturers would come forward to testify the saving which could be effected by efficient smoke consumption, and that some of them would be willing that their factories might be used for experiments. Smokeless coal was a good means of reducing smoke, but a mixture of bituminous with steam coal gave very good results.

Mr. HADLEY, late of the City Flour Mills, had derived great benefit from using smokeless coal, as had others. Smokeless coal was a good means of reducing smoke, but a mixture of bituminous with steam coal gave very good results.

Mr. McCULLOCH, R.N., said that London could be relieved of 90 per cent. of its smoke by proper appliances and by burning the two coals, bituminous and anthracite, in such a proportion that they would help each other. In the Navy no difficulty was found in consuming smoke. The manufacturers of London would find it to their advantage to put up effective apparatus for smoke consumption. There was, no doubt, great waste; but as to three millions being lost out of five, that might be so in domestic consumption, but in manufactories it might be prevented.

Captain GALTON was of opinion that in manufactories the waste was nothing like the proportion suggested; but in domestic consumption he believed the loss to be quite as great as was stated by the Chairman. The question was not between burning anthracite and bituminous coal; the form of the open fireplace might materially assist them. Dr. Siemens proposed a fireplace to burn a mixture of coke and gas in a most convenient form (see page 237). His arrangement was easy and simple, but it involved expense. The smoke question was a very difficult one, which could not be met by legislation, but required the co-operation of the whole community before they would succeed in delivering London from smoke. It was not a matter of this year or next, but a matter which ought to be kept in mind, and every new fireplace introduced into a house should be one which would assist in the consumption of fuel and the prevention of smoke, for then, by degrees, they would have a system which would relieve London from one of its greatest curses.

Mr. CLAY, representing Messrs. Clay, Sons, and Taylor, stated that their premises in Queen Victoria Street were so situated as to render it necessary that they should, not only theoretically, but practically, consume their own smoke. Some years ago, they had a Lancashire boiler erected, combining all the most recent improvements, including a steam jet, to consume the smoke in the furnace, and improved fire-bars; but all failed to give the desired results: they were compelled to use smokeless coal. For many years they burnt nothing but coke and breeze, and the problem then was how to get sufficient draught. On obtaining the sanction of the Manchester Boiler Insurance Co., they had their boilers set on the principle introduced by Mr. Livet, which was fully described in the *Engineer* of May 28th, with a statement of the economy obtained in the consumption of coal; and from that time they produced no smoke at all. Since the last meeting of the Fog and Smoke Committee, they had been invited to try the experiment of burning anthracite coal in their furnaces. Their experience, which as yet had been confined to one ton only, had satisfied them that it answered their purpose very much better than coke, and they should be inclined to make further trials. The amount of waste with anthracite was very small, and this was to them a matter of great importance, as they had to pay the Commissioners of Sewers for the removal of their waste, as well as to pay for the carriage of their coals.

Mr. STEVENS gave the results of his experience in the burning of anthracite coal, and stated that he had found instances where 56 lbs. of anthracite coal burned, in a 36 in. grate, for forty-five hours continuously, without being touched. It was then cleared of ashes at the bottom, when it burned for twenty-one hours, until it was all consumed.

Mr. FLANNERY, M.E., said he could not sufficiently emphasise what Captain Galton had said, that this subject should be divided into two branches, (1) the consumption of coal for steam purposes under boilers, and (2) what for their consideration was a much larger subject, the consumption of coal for housekeeping purposes in grates. He was of opinion that the work of the Committee of Experts, whose duty it would be to report as to the best means of doing away with smoke, should be divided into two branches, and he thought the Committee should as far as possible be subdivided to deal with these two divisions. With respect to the statement made by the Chairman as to the amount of waste in the consumption of coal, he would remind the meeting that Prof. Rankin, than whom no higher authority on combustion existed, stated that in every steam-engine the amount of heat contained in the coal was at least ten times greater than the work produced, *i.e.*, for every 10 lbs. of coal used, the same amount of work could be produced with 1 lb. of coal, if it were properly consumed and effectually used. The production of smoke was the consumption of fuel. The smoke, if properly combined with air, would ignite, but if not, would go up the chimney in waste and poison the atmosphere. He did not hesitate to say that it was possible to do away with the production of smoke.

Mr. DAVID BEVAN (Neath), in offering suggestions gathered from his personal experience of many years in the burning of smokeless coal, particularly for the generation of steam, stated that the cost of the application of an apparatus which he had in use, to existing boilers was altogether of a nominal character. To apply it to existing works and manufactories would not exceed forty shillings. The following was a description of the furnace and apparatus to which he referred. The space underneath the fire bars was closed in front; to this chamber was conducted a funnel-shaped tube, into which was inserted a small steam-jet. The vacuum created thereby caused a continuous current of atmospheric air to pass into the chamber under the bars, thereby supplying the anthracite fuel with the oxygen needed. He found a considerable advantage obtained by using the small narrow bar instead of the heavy one in general use.

He mentioned that the bars under the boilers had been in use for more than twelve months, and although subject to 'white heat' daily for that period, were no more the worse for wear than on the day when they were first put in.

Mr. BANFIELD read the following communications, as illustrating what had been said with respect to the economy obtained by using anthracite coal, and the practicability, by a simple mode, of supplying boiler fires with sufficient air.

Steam Saw Mills, Swansea, September 27th, 1877.

Dear Sir,—The results we have obtained from the use of anthracite coal with the blower are :—1st, A saving of about 25 per cent. of fuel; 2nd, at least 50 per cent. more steam; 3rd, about one-fourth the quantity of ashes. The fire-bars are as good to-day, after six months (about) use, as when put in. Any other information you may require we will be happy to give, or you can inspect the apparatus at any time. Before fixing the blower we were so badly off for steam, that we were about putting up another boiler; we have now an abundance of steam.

(Signed) David Davies and Co.

James Banfield, Esq.

Swansea, February 9th, 1878.

Dear Sir,—In reply to yours of the 7th, the chief advantage we gain by using the patent bar and blower is the saving in the consumption of coal, which we estimate to be about fifteen per cent. Formerly we used small bituminous coal, which, as you are aware, can be bought at a cheaper rate than nut or steam coal. We may not be using more than three-fourths the quantity of coal, but, notwithstanding this disadvantage in the difference in price, the saving effected is certainly 15 to 18 per cent. The bars are kept much cleaner by this process, and the quantity of ashes is, also, less in proportion.

(Signed) Marcus Moxam and Co.

James Banfield, Esq.

Swansea Tin-plate Works, February 12th, 1880.

My Dear Sir,—I reply to your favour of the 7th inst. Since we have adopted the undergrate blowers and anthracite coal, our consumption of coal is reduced to nine tons per 'turn' of twenty-four hours; we previously used thirteen tons of steam coal to do the same work, with this difference, that then we were often short of steam, and now we have an ample supply.

(Signed) John J. Jenkins.

Mr. ERNEST TURNER stated that the Directors of the London and Provincial Steam Laundry had, for the last few days, made trials with anthracite coal at their premises in Battersea Park Road, with satisfactory results. With two 20-horse power boilers they obtained a pressure of 32.1, against 26.5 with the ordinary coal, whilst the consumption had been ten barrows of anthracite against sixteen barrows of ordinary coal. They had used it in their disinfecting furnaces with equal success. It was alao tested in the ironing stores, which consume about a ton of coal per diem, a fierce and constant heat being required, and it was found that after feeding with anthracite the stoves could be kept for an hour without stoking, whereas with the ordinary coal they required attention every half hour. It was proposed to make further trials, the results of which would be communicated to the Fog and Smoke Committee.

Mr. C. H. PERKINS (Swansea) read a communication from Messrs. John Hall and Co., Gunpowder Manufacturers, Faversham, who had used anthracite coal for thirty years, and who expressed themselves well pleased with the results. It was of great service to them, on account of the absence of smoke and spark. No alteration in their furnace was needed, and they used no artificial draught. The distance between the fire bars in the larger was one inch, and in the smaller five-eighths. There was a saving in economy of fuel of 25 per cent. Living, as he did, in South Wales, and seeing so much of the use of anthracite coal for manufacturing and domestic purposes, he had listened with an amount of surprise to some of the remarks made with respect to its practicability. Several of the towns in South Wales were quite smokeless from the use of anthracite, which was much preferred, for the saving was enormous. It had been urged that ladies objected to its use, in consequence of the absence of flame and smoke, but he thought the cleanly and bright appearance of the grates, etc., would outweigh these objections and the pleasure of poking the fire. With regard to manufacturing purposes, anthracite coal was used with all the engines attached to the various collieries in South Wales, where they would not think of using any other; there was no difficulty attending the use of it, the only difficulty, if any, resting with the stoker, it requiring somewhat different treatment than does bituminous coal. It should not be put on in large pieces, and the bars required to be kept free. In steam ships and other places, where enormous quantities of steam were required, where it was desirable to adopt an artificial draught, the heat was often so great as to destroy the fire bars, but this was obviated by the use of hollow bars, into which a draught was introduced. These hollow bars could be seen in use at the Temple Station of the Metropolitan Railway, where they were adopted in a stationary engine used for pumping water, and which had been in service for a considerable period. In America anthracite was *the* fuel of the country, and there was found no difficulty in burning it. They had enormous supplies of it in Wales, and if the people of London and elsewhere chose to adopt it they would find it an advantage.

Mr. REYNOLDS said the firm which he represented used Welsh smokeless coal on account of the economy attending its use. There being no smoke, there was no difficulty in keeping the flues clean; but he was of opinion that the same advantages would attend the use of bituminous coal if the flues could be kept clean.

Mr. SCOTT MONCRIEFF wished to see the discussion confined to the two important divisions suggested by Captain Galton. The remarks which had been made on the use of anthracite coal for commercial purposes, while of great importance from a commercial point of view, he thought did not bear directly upon the question as to the sort of coal which was at present being used in London. It would be of great importance if any gentlemen who were manufacturers and steam users would give their experience as to the sorts of appliances practically available for doing away with the smoke whilst using bituminous coal.

Mr. W. A. MARTIN said he had had a large amount of experience in dealing with furnaces, and thought there was no difficulty attending the burning of bituminous coal without smoke. A few years ago a lamp would not burn without smoke: a glass was put upon it, and what was the result? They no longer heard of smokeless oil. The same principle, he contended, applied to coal. There was not a furnace under a boiler that was not capable of burning smokeless coal. He contended that the mischief did not rest with the manufacturers, who were largely provided with smoke-consuming apparatus, but with domestic fires. He was not in favour of the adoption of anthracite coal, but thought it more a question of air than of coal.

Mr. WEBB did not think that with smiths' forges

the difficulty could be overcome by burning anthracite coal.

Mr. ROCK stated there was a mode of burning anthracite coal in smiths' forges and he was now having a forge constructed from an American design which would burn anthracite coal.

Mr. COTTON stated that the Government were using anthracite coal for forge purposes at Enfield Lock.

The following resolutions, moved by Mr. McCULLOCH, and seconded by Mr. CLAY, were carried :—

'That this meeting approve the action taken by the National Health and Kyrle Societies in regard to the appointment of a committee and an assistant subcommittee of experts to enquire into and take measures necessary to effect the reduction of smoke in and about the metropolis, and pledge themselves to support the action of the said societies.' 'That this meeting approve the course proposed to be adopted by the committee appointed by the National Health and Kyrle Societies in regard to making and encouraging public trials of various descriptions of smokeless coal and fuel and appliances for lessening the production of smoke.' 'That this meeting approve the proposal to raise a special fund for the purpose of making the trials contemplated by the second resolution, and further approve securing such amendment and modifications of the existing laws as may be deemed advisable.' 'That a deputation wait upon the Lord Mayor and the City Members to interest them in the subject of smoke consumption.'

The CHAIRMAN stated that a fund had been successfully started, two gentlemen in the room having signified their intention of giving £50 each, for the purpose of meeting the expenses attending the contemplated trials. It was very far from the intention of the Committee to recommend any one kind of coal, or any one kind of apparatus, their intention being to try every kind of coal and apparatus submitted for the purpose; and he was of opinion that the problem they sought to solve was one not impossible of solution. The Committee would be glad to receive further particulars from the gentlemen who had spoken, and from manufacturers. Mr. Stevens desired the Chairman to mention that he had a stove which burnt effectually for forty hours, without interfering with, regulated by turning a button. He (the Chairman) could not admit that manufactories were as absolutely smokeless as had been remarked, and they knew that domestic fires were great sinners.

A sixth meeting of the Fog and Smoke Committee of the National Health and Kyrle Societies was held at the offices, 44, Berners Street, on Wednesday, December 1st. The members present included Mr. W. R. E. Coles, C.E., Mr. Atchison, M.A., Mr. J. L. Whittle, Mr. J. F. Flannery, M.E., Mr. C. B. Mosely, Dr. Wyld, Mr. Snell, Mrs. Mallet, Miss Octavia Hill, Miss Le Fevre, etc. In the unavoidable absence of Mr. Ernest Hart (Chairman of Council of the National Health Society), Mr. W. R. E. Coles was voted to the Chair.

As an evidence of the progress of the work of the Committee, and the large amount of interest with which its movements are being watched, it was reported that since the last meeting a mass of correspondence had been received, and many inquiries had been made respecting the forthcoming trials and exhibition of smoke-consuming apparatus. Amongst the lettters, the following reply from the Secretary of the Thames Conservancy, was read:

Thames Conservancy. Offices, 41, Trinity Square, Tower Hill, E.C.; November 25th, 1880.

Sir,—I have laid your letter of the 15th inst. before the Conservators of the River Thames, who direct me to state in reply thereto that they have power within their own limits in respect to the production of smoke by steam vessels, and that these powers have been, and will be, exercised duly in the interest of the public. The Conservators have, however, no powers with respect to vessels whose voyages extend beyond the Nore.—I am, sir, your obedient servant, E. BURSTALL, Secretary.

Ernest Hart, Esq., National Health Society, 44, Berners Street, Oxford Street.

In the course of a discussion on the letter, Mr. J. L. WHITTLE stated, that so far as his observation went, steam-tugs and similar appliances emitted the largest amount of smoke.

A communication was read from the Committee of the South-Eastern Sanitary Association, Blackheath, who stated that Blackheath was being constantly deluged with smoke from the other side of the river, caused by factories in the district of West Ham. Redress had been sought from the Greenwich Local District Board of Works, as also from the Metropolitan Board of Works, both of which expressed their inability to assist them. Application was then made to the Commissioners of Police, from whom the following reply had been received:—

No. 2301.

4, Whitehall Place, S.W., 6th December 1878.

Sir,—I have to acknowledge the receipt of your letter of the 26th ult., respecting smoke nuisance from factories on the north bank of the Thames, and to acquaint you in reply that the police have no control over the premises, as they are not situated within the Metropolitan Board of Works district. They are in the parish of West Ham, and under the supervision of the West Ham Local Board of Health; but that Board has hitherto taken no proceedings, and seems reluctant to do so.—I am, sir, your obedient servant, (Signed)

D. LABALMONDIÈRE, Assistant Commissioner.

A reply of a favourable nature was read from Major-General Scott, in reply to a request for the use of the Concrete Buildings at South Kensington for testing purposes; from Mr. J. Douglas Dick, on behalf of the Royal Horticultural Society, offering to place the adjoining North-West Arcade at the service of the Committee; also replies from numerous Vestries relative to the more effectual working of the Smoke Acts as they at present exist, with letters containing suggestions from a large number of correspondents, and other offers of help. Colonel Festing expressed a wish to be placed on the Committee.

The CHAIRMAN reported an important communication from Mr. Yeo, Chairman of the Swansea Harbour Commissioners, Swansea, who could speak with authority concerning the facilities of the Port of Swansea as regards the transmission of coals. Swansea Harbour was the natural outlet for anthracite coal, and Mr. Yeo's evidence would have an important bearing upon the question of the price at which the coal could be supplied in London. They had had evidence that if the smokeless coal were brought into London by sea, the price would be a great deal lower than if otherwise transmitted.

Mr. ATCHISON stated the circumstance of the boat *Emily* having run a distance of twenty-five miles and back on the Thames, burning anthracite coal, without smoke.

The CHAIRMAN thought they would receive the co-operation of the owners of collieries of bituminous coal, when they came to understand

that the Committee were not advocating the use of smokeless coal only, but also appliances by which smoke might be reduced. It was not proposed to abolish the use of bituminous coal, but to prevent its being used in a way obnoxious to the public. He also reported that most important evidence was forthcoming from Mr. McCulloch, of the Admiralty, respecting actual trials with a mixture of bituminous coal and anthracite, which would be laid before the Expert Committee.

Dr. WYLD stated that he had experimented with anthracite coal during the past week, in grates at his own house, and he had found that, by adding a little ordinary coal at lighting, a good fire could be maintained throughout the day with anthracite, which might be left for hours untouched and would not go out, but it had not burned with like success in his kitchener, there being not sufficient flame to reach round the oven.

Miss OCTAVIA HILL called attention to a letter which had appeared in the *Daily News* from a correspondent who had burnt anthracite in a close kitchener with success (see page 234).

Miss LE FEVRE had tried anthracite coal in a kitchener with similar success.

Mr. SAXON SNELL stated that smokeless coal, which was a kind between the bituminous coal and anthracite, gave rather more smoke, but it had the advantage over anthracite of producing more flame. He referred to smokeless steam coal, which he had used for years in his kitchener without experiencing the slightest difficulty. He had recently been in communication with the Directors of the Gas Light and Coke Company, who were anxious to assist the Committee; their Engineer, Mr. Robert Harris, was desirous of being placed on the Committee.

This proposition was carried unanimously.

The CHAIRMAN stated that it was proposed, contemporaneously with the trials of coal and apparatus suitable for domestic fires at South Kensington, to have a series of trials at two or more well-known factories, which would be presided over by some members of the Committee of Experts.

The CHAIRMAN mentioned that a letter had been received from Mr. Trevor A. Williams, who stated that he had used anthracite coal in his house for nine years, and had never had occasion to have his chimney swept.

Miss OCTAVIA HILL observed that before the Committee recommended the adoption of any suggestion it was desirable they should themselves experiment upon a large scale.

Mr. ATCHISON did not see the advisability of discussing the question of furnaces consuming their own smoke. There were innumerable inventions for that purpose. What they were most concerned in was the subject of smoke consumption in domestic fire-grates.

The CHAIRMAN stated that it had been proposed to send a circular to manufacturers, advising them of the course which the Committee proposed to take; viz., that of making certain grants to manufacturers for the carrying out of the necessary trials with coals and smoke-consuming apparatus.

Mr. FLANNERY suggested that they should wait for the recommendations of the Committee of Experts, after which a circular should be sent to the manufacturers stating the result of their deliberations, and that any manufacturer making any trial upon such recommendations should be ensured against any loss in the case of failure, and he would most certainly reap a benefit in the case of success. Mr. Flannery was of opinion that every suggestion should be considered on its scientific merits.

The CHAIRMAN, in reply to a question, stated that the exhibition would take place so soon as sufficient funds were at the service of the Committee.

Miss POTTER suggested the appointment of a deputation to call upon the manufacturers and arouse them to a sense of the importance of this subject.

It was suggested that awards of merit, in the form of medals, be distributed at the forthcoming exhibition.

Mr. B. MOSELY suggested that an advertisement, taking the form of an appeal for funds, should be sent to the daily papers.

This proposition was unanimously carried.

On December 6 a deputation, consisting of Mr. Ernest Hart, Professor Chandler Roberts, F.R.S., Colonel Festing, the Rev. H. V. Le Bas, the Rev. S. A. Barnett, Mr. S. Hadley, Mr. W. R. E. Coles, and others, had an interview with the Lord Mayor, at the Mansion House, to interest him in the efforts now being made by the joint committees of the National Health and Kyrle Societies, to reduce the mischief arising from the present production of smoke in the metropolis, and to request him to let them bring the matter before the notice and attention of the citizens by means of a meeting at the Mansion House on the subject.—The Lord Mayor thought it a matter well deserving public attention, and he said he would gladly allow a conference in the Long Parlour of the Mansion House on Friday, January 7.

THE PARKES MUSEUM OF HYGIENE.

ON Saturday, December 11th, a course of lectures to members of Building Societies was commenced at this museum. The subject of the lectures is 'Dwelling Houses'; that on the 11th, when the lecturer was Mr. Edwd. C. Robins, F.S.A., was specially devoted to *Situation and Construction.* Between 60 and 70 members of Building Societies were present. After a few words of introduction from the Curator, Mr. Mark H. Judge, Mr. Robins spoke on *Sites.* He preferred those where the fronts and backs of houses could face east and west. Places where rubbish had been shot should always be avoided, and with impervious soils a bed of concrete should always be put over the whole area to be covered by the building and areas. Damp-proof courses should never be omitted in any walls, and though the Building Act allowed of 9-in. external walls, he thought for dwelling-houses all these walls should be fourteen inches thick. Concrete walls were approved, and the details of construction were fully explained, the lecturer remarking that in proportion as they understood the true principles of architecture, so would their appreciation of the work of the architect be increased. It was as necessary to attend to repairs as to see that buildings were properly erected in the first place. Terra cotta and artificial stone, both for rough and finished work, were highly spoken of, and at the close of the lecture Mr. Robins explained many of the articles exhibited in the museum. Mr. Rutherfurd, Director of a Building Society, proposed a vote of thanks to Mr. Robins and the Executive Committee, and expressed a hope that before long the Museum would be sufficiently well supported to enable the committee to arrange for the delivery of such lectures with better accommodation, so that a larger number might benefit from them. The resolution was carried with acclamation.

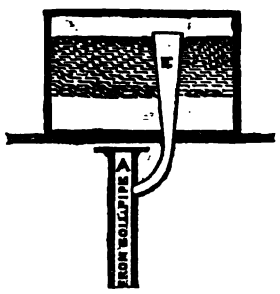
CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

INGENIOUS MAL-CONSTRUCTION.

Whilst making a sanitary inspection of a house a short time since, I discovered a case of mal-construction so gross as almost to lead me to the belief that the designer of it must have used his utmost ingenuity to invent something as dangerous to life and health as possible.

It is the most common thing in the world to find the waste pipe of the drinking-water cistern, with its overflow, lead into the D-trap of a W.C., but probably none of your readers know of a case where the builder has taken the trouble to ventilate his soil-pipe with a 3-inch pipe into the covered drinking water cistern of the house. This was almost literally the case in the house to which I refer. My sketch will show the exact arrangement.



A is a 3-inch cast-iron pipe brought direct from the soil-pipe without any trap whatever. It has been stopped short off by a slate being cemented over it just below the cistern at B, but out of the side of it a branch E has been taken—this also without trap—to form the overflow of the closed cistern. This is the less excusable, as, the cistern being on the roof, it would have been the easiest thing possible to allow the water to overflow from a short pipe on to the leads.

W. K. BURTON.

Adelphi Chambers, 7, John Street, Adelphi, W.C.
October 29th, 1880.

ZYMOTIC DISEASES.

I perceive that in your mortality statistics of urban sanitary districts, for the month of October 1880, the number of deaths under the head of zymotic diseases for the city of Bath is stated to be ten, and the average zymotic mortality, in proportion to population, is stated as 2.4 per 1,000 annually.

If you will kindly refer to the card forwarded by me, you will find that I have only enumerated four deaths from zymotic disease, not *ten*, and the zymotic death-rate per 1,000 annually, as represented by me, is 0.8, and not 2.4.

I can account for this difference in our figures and calculations only by your having added to the four cases of truly zymotic disease, *six* cases of diarrhœa, which were placed properly and advisedly, by me, under a different category, as not one of these cases of diarrhœa were of the zymotic type, either in causation or consequences, no others having been infected, so far as I know, through them. The city of Bath has been perfectly free from diarrhœa of that type which has gained for Leicester and other places an unenviable notoriety, and I think it most unjust that the sanitary reputation of a city should suffer because a few deaths are reported from diarrhœa, which, had they occurred at any other period of the year, would simply have been passed over without special notice; certainly not added to the abhorred list of zymotic mortality.

I contend that diarrhœa, at this or any other period of the year, may arise in two different forms, and from two totally different causes—different also as to treatment or infective consequences; first, diarrhœa may be of the type of so-called autumnal or choleraic diarrhœa, which doubtless, whatever be the causation, is most prevalent in autumn. Of this form I have lately seen several cases, though, fortunately, there were no deaths, all in children, and caused by drinking impure water at a horse-trough. This form of diarrhœa, I admit, may be *zymotic* in cause and consequences.

The second form of diarrhœa is of a totally different kind; different in causation and treatment, and non-infective in consequences. In my opinion this form of diarrhœa is caused by improper food, particularly abundant in autumn, such as unripe or decomposed fruit, decomposed meat, or decomposed fish, particularly mackerel, all these articles of diet being largely vended in an almost poisonous condition; the result of their use being inflammatory diarrhœa or enteritis. I need not refer to the essentially different treatment advisable in these two forms of disease.

I quite agree with the remarks made by Dr. Longstaff, in his interesting paper embodied in the *Transactions* of the Society of Medical Officers of Health for Session 1880-81, and in the main agree with the conclusions drawn by him as to the initiation of the zymotic form of diarrhœa, which may be the result of bad air, whether from 'soil' or 'sewer'; but an experience of over twenty-five years does not corroborate the view that *all*, or even the *majority* of cases of 'autumnal diarrhœa' are of this type. On these grounds, I trust you will pardon me if I beg leave to demur to the statistics of zymotic disease and mortality in the city of Bath, as reported in the SANITARY RECORD for October, and to adhere to the statistics recorded in your card by me, inasmuch as I have full personal knowledge of their accuracy.

Possibly the insertion of this letter in the next SANITARY RECORD might tend to call forth remarks and opinions which would be highly valuable on the interesting question of the proper position in sanitary medical nomenclature for so-called 'autumnal diarrhœa'.

A. B. BRABAZON,
Medical Officer of Health, City of Bath.

[Dr. Brabazon is correct in his explanation of the difference between his figures and those published in the last issue of the *Sanitary Record*, bearing upon the mortality from the seven principal zymotic diseases in Bath during October. Apart altogether from the question of the correct classification of summer diarrhœa (which has frequently been discussed in these columns) uniformity is one of the main objects we had in view when we started our monthly tables of mortality statistics; this uniformity (so far as Bath is concerned) would be destroyed if we had followed Dr. Brabazon's suggestion to exclude the six deaths from diarrhœa in October from among the seven zymotic diseases. Neither can we recognise any injustice to the sanitary reputation of Bath, in dealing with it on identically the same principle as other towns and cities. It is a fact that the deaths referred to diarrhœa in Bath, were three times as numerous last summer quarter as they were in the corresponding period of 1879; this points to the conclusion that the summer diarrhœa which prevailed during last quarter in Bath, was similar in character to that which prevailed in Leicester and in other large towns, although of so much less fatal a type. We fear that it is practically impossible from the death-register to separate what Dr. Brabazon describes as the two forms of diarrhœa, even if their distinctive

characteristics could be accurately defined and agreed upon; and in conclusion it scarcely seems necessary to insist that the diarrhœa which is admittedly due to improper, decayed, or sour food, and to unwholesome or decomposed fruit, meat or fish, is correctly described as zymotic in character. Whether infantile summer diarrhœa be or be not correctly classified to the zymotic class of diseases, and no other satisfactory theory of causation has been accepted, we are at a loss to see that anything but evil would result from disregarding and withdrawing from discussion in local periodical returns of mortality the marked variations in the distribution and fatality of summer diarrhœa.—THE EDITOR.]

HEALTH LECTURES FOR THE PEOPLE.

I should be much obliged if you would kindly let me know where Dr. H. Ashby's lecture 'On the Ventilation of Houses' can be obtained. E. V.

[The lecture in question is one of the 'Health Lectures for the People', issued by the Manchester and Salford Sanitary Association (Secretary, F. Scott, 100, King Street, Manchester), and published by John Heywood, Ridgefield, Manchester. Each pamphlet is 1d.; each volume, 1s. There are three volumes published.]

DISINFECTING APPARATUS.

Will you, or any of your readers, kindly give me information as to the best form of disinfecting apparatus for a small district. T. H. W.

Westfield House, Stapleton, Carlisle,
November 29th, 1880.

[Our correspondent will find information on this subject at page 158, SANITARY RECORD, October 15, and at page 207 of the present issue.—Ed. S. R.]

THE DISPOSAL OF TOWN SEWAGE.

A correspondent asks advice as to the means of obtaining information as to the best mode of disposing of town sewage.

The Board of Guardians of the D——— Union, acting as a Sanitary Authority, constructed some time ago a complete system of sewerage for the town of D———. The town is situated on the side of a hill, and all the sewage of the town, after passing through two tanks, is discharged into a stream and mill-race, but the pollution of the mill-race is now proved to be more than before the sewerage was in operation, and a local manufacturer has applied to the Court of Chancery and obtained an injunction ordering the Sanitary Authority to have the sewage purified, so that they are in great difficulty. Four engineers have reported on the question already.

[Suggestions for the solution of this difficulty are invited.—ED.]

A SANITARY IMPROVEMENT.

May I be permitted to add a few words to the notice with which you favoured my improvements in sewer-valves in your last issue.

The wording of the first portion has, I find, conveyed the impression that my improvements apply solely to outlet-valves. This is not the case, as they are universally, or almost universally, applicable to all kinds of flap-valves, whether on main sewers, at outlets, or manholes, as well as at gullies and soil-pipe junctions. I would also correct the closing statement, that Messrs. Emmerson, Murgatroyd, and Co. were the makers. At the time your notice was published, a definite arrangement with authorised makers had not been concluded, but this has since been done. Messrs. Blakeborough and Sons, of Brighouse, Yorkshire, have undertaken the manufacture, to whom all inquiries in the matter should be sent.

Whilst upon this subject, I would refer to your article on 'Sewer Ventilation' in the same issue (November), every word of which I can emphatically endorse. With proper arrangements for compelling each length of sewer to be ventilated by a proper number of ventilators, no difficulty need be experienced in any way. With the imperfect valves at present in use, one ventilator has frequently to do the work of many which are either inactive or have down draughts in them. By the exercise of due thought in designing sewerage systems, and by the application of our knowledge (imperfect though it is at present) of the action of induced currents, there need be no complaints of nuisance from ventilators, or the necessity for shafts or lamp-posts to be pressed into the service. C. SPENCER ROLFE.

SEWER AND DRAIN VENTILATION.

The theory which is enunciated in the SANITARY RECORD (Nov. 15, 1880; page 169), that 'no sewer-gas' will arise from so-called self-cleansing sewers, is not, in my judgment, a reliable one; for sewers and drains, whether they have a slack or sharp fall, obtain a coating more or less of slimy matter nearly throughout their course, which gives off a most offensive smell.

Only recently I examined a vertical drain, which received the waste water from a bath and lavatory-basin on the first floor, which had been in use about eighteen months. The drain was coated on the inside with matter which, when removed, somewhat resembled bacon-rind. This pipe was open at the lower end, discharging on to a surface-sink, and ventilated by a tube fixed at the upper end. In this case the air contained in the pipe descended, or the smell would not have been perceived at all. The height of the drain was about twenty feet, and, because of the nuisance, the lower end has been connected with an ordinary siphon-trap, the ventilating-tube at the upper end being left as before. No inconvenience has since taken place. No amount of water flush, or air inlet or outlet ventilation, will prevent this occurring. In addition to the corruption of the drain air from this source, there will be the effluvia arising from the drainage matter in transit, further polluting the drain air. This applies to sewers as well as drains, and therefore no drain inlet should be left untrapped.

During more than thirty years' experience and close observation of the subject, I have found, except under very favourable circumstances, the air-current in a drain is as fitful as the draught in an almost incurable smoky chimney. A constant current of air in any one direction through the drain is not to be obtained; an occasional current, or, as I prefer to call it, an occasional special air supply, may be easily obtained, by fixing in a suitable position outside the house a valve-protected opening in connection with the drain, so hung that the air-pressure from within shall press against it and close it more firmly, in such a manner that atmospheric pressure and wind from without shall open it and admit fresh air. The valve thus fixed will open and admit fresh

air when water is discharged into the drain, and also when there is a slight difference of temperature between the drain and the outside air. For the egress of drain, a tube should be provided from the top of the drain, or top of the highest branch, and carried up the building, taking care to finish at the top, where the air discharged cannot enter the house or building by a window, open-eaved roof, or a chimney down draught.

I do not think it well for special ventilating-shafts to be made for the public sewers through, or by means of, private house drains. I would also advise that the work should be done separately, by, and at the expense of, the local authority; and in drains treated as before described, the fixing, between the air inlet supply, or between the connection of the first branch inlet drain and the connection with the sewer, a horizontal siphon-pipe dip, with vertical pipe springing from the centre of the dip, and carried up to the surface, properly sealed and covered at the top for occasional clearance. This trap, if perfectly well made, will effectually resist sewer or drain-air pressure, and completely cut off or separate the drain from the sewer air.

The multiplication of air inlet- and outlet-tubes to branch drains, and air inlets and outlets to siphon-traps, is, I believe, fraught with much mischief, and the reservoir space for drain air is needlessly increased; the cost and difficulties of proper maintenance are also increased. So many extra risks of smell arise from the imperfect jointing, fitting, and from the apparatus getting out of order, or being ignorantly and carelessly put out of order. The more complicated the apparatus, the greater the facility for the hand engaged upon the work to leave something undone or imperfect.

The drain inspector's occasional call will not enable him to detect many points where defects may be left. Simplicity, and not complication, in the work of house-drainage is needful for an approach to perfection. In order to attain this, reduce the drain inlets to the smallest possible number; have no surface inlet to drain in kitchen, scullery, passage, or cellar, or any place where rain-water or other water will not occasionally flow to keep the trap charged (and the floors of these places are better washed with mop and flannel when necessary); let the drain be made sound, and thoroughly sealed at every joint, laid on the shortest and most direct line possible, from point to point, and every inlet sealed from back drain air with a simple and effective trap.

If an outlet-trap be fixed, to separate or cut off the sewer from the drain air, then an exit-tube for ventilating the drain should be provided. This trap causes an entirely new condition of things within the drain. During the reception of inflowing water, the weight of the water is exerted and expended upon the drain air—strictly, producing pressure on every trap; and this means woe to the weakest trap, unless strong enough to resist the force—instead of expending itself on the drain air and sewer air together.

By far the majority of houses drained have no outlet-traps; the drain and branch drain air are one, and in connection with the sewer air volume, the sewer air being changed through untrapped inlets, and again changing and renewing the air in the drain through the outlet and along its course, both changes being aided by variation of water-flow and atmospheric and drain temperature, either or both of which cause a change of air in the sewer or drain.

It is, however, a common mistake to suppose that this difference of temperature is sufficient to unsiphon a well-made dip-trap. Water traps are generally unsiphoned from one or other of the following causes.

1. A sudden discharge of water, passing the small outlet of a branch drain, acting on the injector principle upon a quarter or half-inch dip.

2. Evaporation of water in the trap, assisted by the overheating of the material of which the trap is made under a hot sun.

3. Siphonic withdrawal of the water by string, straw, cotton, wool, or paper hanging partly in the water and partly over the overflow, and down into the drain or pipe.

Drain air escapes into or about the house, not because there is no special air supply to, or special air exit from the drain, but because of some defect in the drain, trap, or draining apparatus. In such cases no special air supply or air exit will remedy the mischief. They may dilute the drain air escaping through the defect, but the poison will still come out, in weaker, but still in dangerous form. The remedy *must* be applied to the actual defect.

JAMES LOVEGROVE, Assoc. M. Inst. C.E.
Town Hall, Hackney, Dec. 7th, 1880.

SANITARY INSPECTION IN RURAL DISTRICTS.

At the Sanitary Congress, lately held at Exeter, some remarks were made with regard to sanitary inspectors not altogether favourable to that body.

I am quite prepared to acknowledge generally the truth of these comments; but, with a view to effect an improvement in the condition and circumstances of inspectors, I venture to ask you to allow me to call attention to this subject.

The position of inspectors in rural unions is most unsatisfactory. They are miserably paid, considering the great expense of horse keep or hire incurred in carrying out the work; and they are also virtually removable by the authority at will. The rural world is not yet aroused to the necessity of sanitary improvements and greater cleanliness amongst the cottage occupiers. Many of the guardians, as I know well, are altogether opposed to anything of the sort, on the ground of interference with the liberty of the subject—more, on that of the expense (though small) incurred. All the interest in these matters is confined to a small body of more enlightened men on the board.

The appointment of inspecting officers being compulsory upon the authorities by the Public Health Act, it results that the very lowest salary which will produce a candidate is fixed, regardless entirely of capabilities for the office. The appointment is, in most cases, given to very young men, of no experience whatever, who merely accept it as providing them a bare subsistence until something better turns up, or to old, worn-out, superannuated men, from motives of charity. Sanitary knowledge, commonsense, and efficiency are the last considerations—the smallness of the salary the first. Many inspectors are as good as told, "We are forced to appoint you; but the quieter you keep yourself, the better we shall like you. I have seen salaries fixed as low as £40 per annum. What else can that mean?

There is nothing in the circumstances to tempt men to train themselves for such appointments, or to make themselves acquainted with sanitary requirements when they are appointed. There is no chance of improvement in their position, and no hope of promotion.

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I earnestly hope that some steps may be taken with a view to promoting their interests, and I beg to make an urgent appeal to the medical officers of health, under whom they work, for their co-operation in some movement for bringing their case before the authorities on the Local Government Board.

SANITARY INSPECTOR.

SOAP-SUDS.

Can any of your readers inform me as to the best plan of dealing with large quantities of soap-suds escaping from a steam laundry? There is no system of sewers in the village where the laundry is situated. Is there not some method for precipitating the alkaline matter, so as to make it useful in softening water, and allowing the effluent water to pass into the ditch? Does a laundry employing over fifty persons come within the Factory Acts?

W. L.

'POLE'S SYPHON WATER-CLOSETS.'

At page 157 of your issue for Oct. 15th, Alderman Bennett says :—'I wish it to be understood that the syphon referred to is the only trap between the closet and the main sewer. There should be no second trap of any kind, as gas generated between two traps may have sufficient pressure to force its way into the house closet the instant a lever is raised, or water poured in. This remark applies to most closets.' In Alderman Bennett's statement that his closet-trap is the only trap between the house and the sewer—there being no trap on his house-drain—he acknowledges a breach of the law, and renders himself liable to be taken to task (as he ought to be) by the Local Government Board, or other constituted authority. As to his other assertion, 'that there should be no second trap of any kind, as gas generated between two traps may have sufficient pressure to force,' etc., he only exposes his own ignorance, for with a ventilated trap such as the 'Buchan's Trap' shown in illustrations on pages 115 and 116 of your issue for September 15th, 1880, or any other traps having a ventilating pipe properly put in between them, no such 'pressure to force' as Alderman Bennett imagines can exist: his reasoning therefore is a total fallacy, and like his sanitary practice, a dangerous mistake. If Alderman Bennett will turn back to page 116, and look at the illustration on the second column, he will see how to put in two traps without any chance of gas accumulating or 'pressure to force' being able to arise. W. P. BUCHAN.

21, Renfrew Street, Glasgow, 27th Nov. 1880.

P.S.—Permit me to add that the word 'siphon' should always be spelt 'siphon', as it is of Greek origin. 'Syphon' is wrong.—W. P. B.

FILTRATION OF WATER IN THE MILITARY SERVICE.

I desire to make one or two corrections with reference to Mr. Bischof's paper on 'Filtration of Water in the Military Service' in the last number (November) of the SANITARY RECORD. In particular, he has mistaken some of the expressions used in my report in the A.M.D. Blue Book. He says, 'Let us refer to page 211, number 2. Here, under the heading "Continuity of Action," carferal is simply omitted. There is, indeed in the report (p. 205, seventh series) a single experiment, intended to prove the continuity of action, by the filtration of twenty (?) gallons.' Here Mr. Bischof confounds 'continuity of action' with 'durability of filtering power'. Perhaps I did not make my meaning clear, but by 'continuity of action' I meant 'continued permeability', and absence of 'clogging'. As the carferal showed no tendency to clog, it was unnecessary to mention it. As regards the experiment on the filtration of twenty gallons, which Mr. Bischof thinks worthy of a note of surprise, (if not exactly of admiration), he has not stated the case quite accurately. It was *not* an experiment on the filtration of twenty gallons, but an inquiry into the condition of ordinary water passed through a filter which had been previously treated with an excessively impure solution. The mixture put into the filters represented an amount of impurity equal to that of many thousands of gallons of ordinarily impure water. Then twenty gallons of fairly good water were passed through, and the twentieth gallon examined, to see how the filters had dealt with the impurity, and if they had yielded any other water.

The experiment was doubtless an imperfect one, though hardly so preposterous as Mr. Bischof makes it appear.

I may add that my report was a qualified one, and that I indicated my intention of continuing the experiments. That the authorities should have made their decision 'precipitately' as Mr. Bischof seems to think, is not my fault, and I was not even informed of the fact until a long time after, indeed, I believe I first learned it from Mr. Bischof himself. Mr. Bischof complains that 'no attempt is made to establish any superiority of carferal over spongy iron, excepting by the supposed greater rapidity of action of the former.' This is quite true, but then it is the whole point at issue. Spongy iron is an excellent filtering medium, but it is slow, and was complained of as inconvenient for service purposes. Carferal was sent to me to report upon, and I did so.

I think constructions have been put upon my report which are not justified, but of course each one who reads it must judge for himself on that point.

Dec. 10th, 1880. F. DE CHAUMONT.

The following is the letter referred to at page 230 as appearing in the *Daily News*.

SMOKELESS COAL.

SIR,—Perhaps you will allow a housekeeper who has made a trial of the smokeless coal to give her experiences. My kitchen range is a closed kitchener, with large ovens on each side. The grate has been lined with fire brick to diminish the consumption of fuel. For two days last week I had smokeless coal, which I obtained through the National Health Society, burnt in the range for experiment, and with the following results. I found that the fire lights easily and quickly, and soon becomes clear and bright; the ovens are heated in half an hour, the hot plate is quickly hot enough to boil saucepans and kettles all over the surface, the flues remain perfectly clean. Also the consumption of fuel is much less than when ordinary bituminous coal is burnt in the range, as the heat given out is very intense, and the fire so quick that about twenty minutes less time than usual is required for roasting joints. To conclude, my cook was delighted, and immediately begged that I would order in some tons of smokeless coal. I have an extensive view of chimneys from my study windows, and for these two days, whilst all my neighbours' kitchen chimneys were sending forth thick volumes of smoke (more particularly between 7 and 8 a.m. and 4 and 5 p.m., the hours when kitchen fires are

being made up and when yellow fogs frequently descend upon London), no sign of smoke was seen issuing from my own kitchen chimney, though I knew that baking and washing were going on downstairs, and that a fire was burning, at the extravagance of which I should have stood aghast if ordinary bituminous coal were being used. In the household fireplace I find that the smokeless coal will not light well unless there is a strong draught; this can be produced by having a temporary blower fitted to the grate, which can be hung on till the fire has burnt up, and then put away, or a few pieces of ordinary coal can be used to commence the fire with. When these are red-hot, the fire can be built up with smokeless coal, which soon becomes a clear incandescent mass, sending out a great heat. The fire requires to be made up about three times a day, it does not require poking, but gradually burns away, leaving very few cinders. I have used the smokeless coal in my house in the ordinary register grate, the large Queen Anne fire baskets with no register in the chimney, and hence no artificially-induced draught, and in the Abbotsford grate, and in all with equal success. The heat given out is so intense that it is a wise precaution to have the grates lined with fire-bricks, both to lessen the size of the fire and to prevent the sides of the grate being burnt away. There is a widely-expressed fear that cooks and housemaids may object to the use of smokeless coal, on the ground that it will give them some extra trouble in lighting fires. There is no extra trouble in any grate with a good draught, as in a kitchener, or any grate fitted with a blower, and the amount of dirty work saved in clearing out soot flues, sweeping chimneys, and general house-cleaning, is so immense that in a very short time, housemaids and cooks will come to see that there is a great economy of time and labour in the use of smokeless coal. Since my experiment of last week, I have succeeded in obtaining some tons of smokeless coal, and now burn it regularly in the kitchen, but having unfortunately filled my cellars in the summer with bituminous coal, I am, against my inclination, still obliged to burn the latter in the fire-place.

A CAREFUL HOUSEKEEPER.

REVIEW.

How to Prevent the Spread of Fever. A Popular Lecture by the Medical Officer of Health to the Borough. Printed at Nottingham.

It does not appear on the title-page of this lecture when, or before what audience, it was delivered, nor indeed, that it has ever been delivered at all. Whether, however, it has been actually presented to a popular audience, or is only a lecture in the potential sense, viz., that it is adapted for delivery to such an audience, we are ready to testify to its suitability for such a purpose, and should be glad to hear that the information which it contains had been utilised for the benefit of other places than Nottingham. The lecture does not, of course, contain anything that is at all novel, but it exhibits the nature of the commoner forms of infectious disease, and enforces the precautions which are necessary to prevent their spread, in a way which, as the Article hath it, is easily understanded of the people. The author points out in particular the limitations with which the term *preventable* is applicable to different forms of disease, and shows that in the case even of those which can be prevented by the direct action of the sanitary authority, a large amount of co-operation is required on the part of the public. It is to the nature of this co-operation that the lecture is mainly directed, especially in regard to scarlet and typhoid fevers, and small-pox. The advice which is given as to the precautions necessary in the first of these cases is excellent. One point in particular is emphasised which is too generally neglected, and that is the tenacity with which infection clings to the hair of scarlatinal patients, and the necessity of frequent and thorough washing of the head during convalescence. We have no doubt, from our own experience, that the neglect of this precaution is a a most frequent source of communication of the disease in cases where in other respects the means that have been adopted to arrest infection would appear to have been satisfactory. For this reason it would seem desirable to extend the plan of oiling the skin, as recommended by Dr. Budd, during the desquamative stage, to the hair, and to insist upon the latter being cut as short during this stage as is possible. There is one point with regard to scarlet fever to which no allusion is made in this lecture, though it is, in our opinion, scarcely second in importance to any, and that is the necessity of extreme suspicion being observed with regard to even the slightest case of sore throat in children under any circumstances, and above all when scarlet fever is in the neighbourhood. It would be difficult to exaggerate the frequency with which extensive outbreaks of this disease have been distinctly traced to a mild and apparently unsuspicious case of sore-throat. Genuine sore-throat is so rare a phenomenon in an ordinarily healthy child that in most cases, when it does occur, some specific cause for it is to be suspected; and though it may not be accompanied by distinct evidence of connection with scarlatinal poison, it is always best to deal with it as if it were. It is to the neglect of this precaution, not only by the public, but, we regret to say, by a large number of the medical profession, that the difficulty of dealing with scarlatinal epidemics is mainly due; for it is these slight cases of infectious sore-throat, often so trivial as not to prevent the child being sent to school, that spread the disease in the most insidious way.

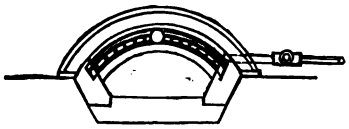
We observe that the author of this lecture commits himself to the position that typhoid fever can 'in all cases be traced to the drinking of polluted water, the inhaling of sewer-gas, or air tainted with infectious bowel discharges.' This view is, no doubt, sufficiently in accord with the opinions of a large number of trustworthy authorities to justify its being maintained; but we feel sure that those who entertain it will be found, as a rule, to have derived their experience chiefly in urban districts, and that observers who have been enabled to study this disease, as it so frequently occurs in isolated and otherwise healthy conditions in rural spots, will not feel so ready to accept it as an exhaustive solution of the problem of the genesis of a disease which shades off so insensibly into uncomplicated low fever on the one hand, and into simple diarrhœa on the other. Nor do we think that it is at all desirable to inform the public, as the author of this lecture does, that typhoid fever is not infectious, even with the qualification that is added, that it is not so 'in the sense that either scarlet fever or small-pox are infectious.' Such a statement would seem to imply that the difference between the infectiousness of these diseases is one of quality rather than, as it is, one only of relative intensity. That the infection of

typhoid fever is not so liable to diffusion as that of small-pox or scarlet fever, especially when easily available precautions are used, may be readily admitted, but that it is infectious, in the sense in which the term is generally used, is unquestionable, and it is only lulling the public into a false security not to let this fact be clearly known. We do not know upon what evidence Dr. Seaton asserts that the infection of typhoid spreads only through the bowel discharges. He himself admits that the disease *rarely* spreads in hospitals, in consequence of the efficient disinfection of the discharges, thereby allowing that even under such circumstances it does occasionally spread. Whilst the possibility of its being diffused in other ways—say, by the excretions from the skin, pulmonary membrane, etc., is still an open question, it appears inexpedient, to say the least of it, to discourage those precautions against needless communication with the sick which people are much more likely to take if they are informed that the disease is infectious than that it is not.

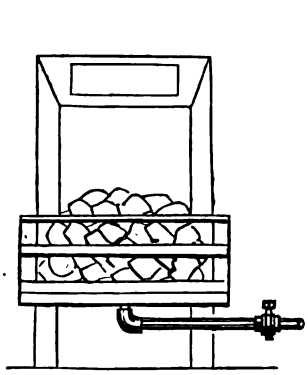
SANITARY INVENTIONS.

INNES'S COKE-GAS GRATE.

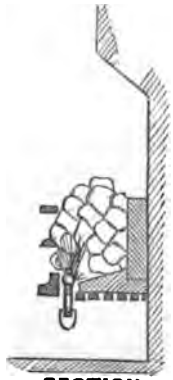
We have recently seen at the office of Messrs. Innes and Burton, 7, John Street, Adelphi, a coke-gas grate, which seems to answer the same purpose as the grate described by Dr. Siemens (see page 237) and to be considerably simpler and less expensive to fit. It is the invention of Mr. Cosmo Innes, M.I.C.E., who described the principle of it in a letter to the Fog and Smoke Committee, dated 27th October last, and who has since worked it out practically and fitted the arrangement to all



PLAN.



ELEVATION.



SECTION.

his own grates. We subjoin a drawing of it, although it is so simple that a drawing is scarcely necessary for its comprehension. All that is required is to line the grate—back, sides, and bottom—with fire-brick, and to introduce a half-inch iron gas-pipe, perforated with thirty to forty 1-16th inch holes, into the bottom of it in front, and then to burn coke in it, stimulating the combustion with the small jets of gas from the 1-16th inch holes, which furnish the amount of flame necessary to make a very pleasant and pleasant-looking fire. The fire-brick in the bottom of the grate is made to slope towards the front, and a space of one-inch is left between the front of it and the perforated gas-pipe, down which space the ashes fall on to the hearth. The grate is found to produce remarkably little ashes—the ashes on the hearth, after a whole day's working, will barely fill a table-spoon—and to make a very good fire with eight cubic feet an hour of gas and two grates-full of coke for the whole day of twelve hours.

	d.
Two grates-full of coke is about a quarter bushel, costs	1½
Eight cubic feet an hour for twelve hours, is ninety-six cubic feet at 3s. 6d. per 1,000, costs	4
Total	5½

which is rather less than one halfpenny per hour.

Whether the grate produces an appreciably smaller heating effect than Dr. Siemens' could only be ascertained by trying the two arrangements in exactly similar grates, erected in exactly similar rooms, and taking the temperature accurately from time to time with thermometers, and we think that this is an experiment which the Fog and Smoke Committee might with great advantage include among those which we believe they intend to make.

THE 'CROWN JEWEL' SMOKELESS ANTHRACITE COAL STOVE.

Mr. HARRY HUNT, of 117, Newington Green Road, has introduced an excellent stove for burning anthracite coal, to be placed in the passage or entrance hall of a house, and thereby warm the air in the passages and on the staircase. It is, of course, equally applicable for warming purposes to churches, school rooms, railway waiting rooms, and public halls. When fixed in the hall of an ordinary dwelling house it warms the atmosphere of the whole house, so that smaller fires are required in the dwelling rooms, and not any in the bed rooms, even in the severest weather. This is a great desideratum, for we all know how, when doors are opened in well-warmed rooms, the sudden rush of cold air from the staircase induces that rough and ready form of ventilation known as a draught; and how but too many are doomed to shudder in the icy coldness of bed-rooms, where no fire is kindled. These inconveniences are greatly mitigated, if not entirely prevented, by the use of the 'Crown Jewel' stove. The consumption of coal in a stove of the smallest size for twenty-four hours is 37 lbs. of anthracite nut coal, costing fourpence, which is asserted to maintain a temperature throughout a moderate sized house of 55 to 65 deg. Fahr. These stoves are remarkably pleasant and cheerful in appearance, and give very little trouble in use. Their more general adoption in this country, as a means of equalising the temperature of our staircases and rooms in severe weather, would, we are convinced, be productive of health and comfort to the community, especially in those establishments, but too numerous, where bed-room fires are conspicuous by their absence, and would also go far to abolish the smoke nuisance.

DR. SIEMENS'S GAS STOVE.

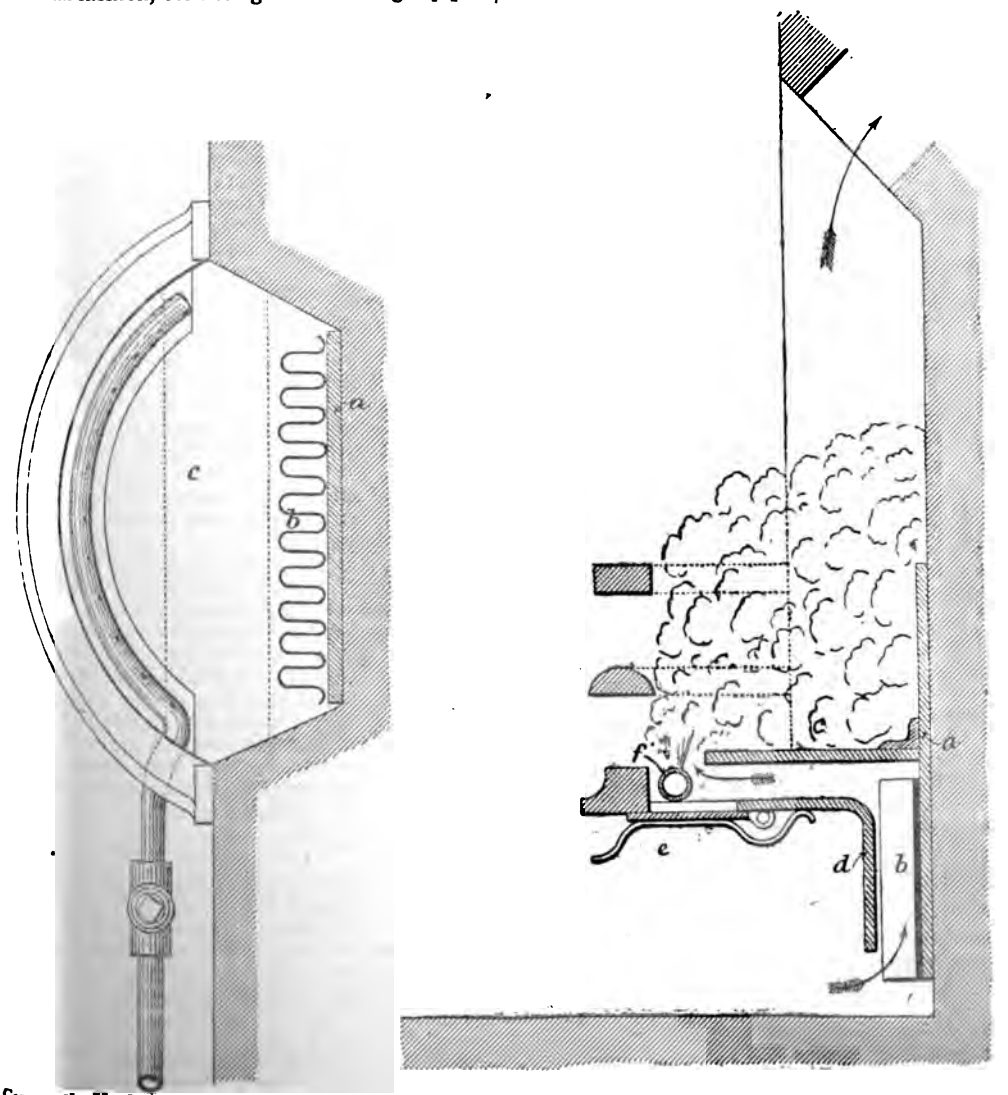
WE reprint the following description, by Dr. C. W. Siemens, F.R.S., of his new gas stove, from *Nature* of November 11th:—

The growing obscurity which distinguishes the winter atmosphere of London has disposed men to consider whether it is an indispensable evil connected with the use of coal in great centres of population, or whether means can be found of providing the warmth and comfort which the copious use of mineral fuel affords us without having to pay the penalty of dispensing with the solar ray, of finding ourselves and everything we touch covered with soot, and of occasionally having, even at midday, to grope our way with a feeling akin to suffocation.

I am decidedly of opinion that the evil is one which not only admits of remedy, but that its cure would result from a closer attention to the principles of economy in the use of fuel.

A gas-grate that was arranged in my billiard-room in the usual fashion, consisting of three air gas pipes with apertures distributed over the fire-grate, and covered with pumice-stone, presented certainly a cheerless appearance, and filled the room (notwithstanding a fair chimney-draught) with fumes, rendering the benefit of the fire a doubtful one. These fumes could not have passed into the room from the upper surface of the pumice-stone, owing to its proximity to the chimney; but a little consideration made me come to the conclusion that these gases really proceeded from the ash-pan into the room. The products of combustion set up by the gas flames ascend no doubt so long as they are intensely hot, but in giving off their heat to the inert pumice-stone they rapidly cool, and being heavier than atmospheric air, descend through the grate between the lines of gas flames, and thus reach the apartment. Moreover, the gas burnt towards the back of the fireplace takes scarcely any part in providing a red radiating surface in front of the grate, serving only to baffle the draught passing towards the chimney from the room.

The first condition to be realised in an efficient



a, Copper plate ¼ inch thick and 10 inches wide at back of grate; *b*, frill of copper 1-16th inch thick; *c*, iron dead plate riveted to plate *a*; *d*, angle plate with trap-door *e* for removing ashes; *f*, gas-pipe about ½ inch diameter with holes ¼ inch apart.

gas-grate consists in suppressing all gas orifices except immediately behind the bottom front bar, and in substituting for the grate a solid dead plate. Instead of using inert matter such as pumice-stone, I consider it far more economical and efficacious to transfer the heat of the gas flames to gas coke or anthracite, which, when once heated, helps the gas to increase and maintain a sufficient temperature for radiation through its own slow combustion. The gas should not be mixed in the pipe with atmospheric air to produce a Bunsen flame, as is frequently done, because by using the unmixed gas, a rich flame is set up between the pieces of coke near the front of the grate, producing to the eye an appearance similar to a well-ignited ordinary coal fire, and the hot carbonaceous matter through which it percolates ensures its entire combustion before reaching the chimney. Heat will, however, gradually accumulate towards the back of the fire, notwithstanding the suppression of the grate bars, and in order to obtain the utmost economy, this heat should be utilised to increase the temperature of the gas flames and of the coke in front of the grate.

To accomplish this, I have constructed a grate according to the annexed sketch. The iron dead plate *c* is riveted to a stout copper plate *a* facing the back of the fire grate, and extending five inches both upwards and downwards from the point of junction. The dead plate *c* stops short about an inch behind the bottom bar of the grate to make room for a half-inch gas pipe *f*, which is perforated with holes of about one-twentieth of an inch in diameter, placed zig-zag, at distances of three-quarters of an inch along its upper surface. This pipe rests upon a lower plate *d*, which is bent downwards towards the back, so as to provide a vertical and horizontal channel of about one inch in breadth between the two plates. A trap-door *e*, held up by a spring, is provided for the discharge of ashes falling into this channel. The vertical portion of this channel is occupied by a strip of sheet copper about four inches deep, bent in and out like a lady's frill, and riveted to the copper back piece. Copper being an excellent conductor of heat, and this piece presenting (if not less than a quarter of an inch thick) a considerable sectional conductive area, transfers the heat from the back of the grate to the frill-work in the vertical channel. An air current is set up by this heat, which, in passing along the horizontal channel, impinges on the line of gas flames, and greatly increases their brilliancy. So great is the heat imparted to the air by this simple arrangement, that a piece of lead of about half a pound in weight introduced through the trap-door into this channel melted in five minutes, proving a temperature to exist exceeding 619 deg. Fahr., or 326 deg. Cent. The abstraction of heat from the back has, moreover, the advantage of retarding the combustion of the coke there while promoting it at the front of the grate.

The sketch represents a fireplace at my office, in a room of 7,200 cubic feet capacity facing the north. I always found it difficult during cold weather to keep this room at 60 deg. Fahr. with a coal fire, but it has been easily maintained at that temperature since the grate has been altered to the gas-coke grate just described.

This heating arrangement is not, however, essentially necessary; in several of the grates which I have altered for gas I have simply closed up the space below the bottom bar by means of a close-fitting ash-pan, and introduced the gaspipe behind the lower bar, an alteration which can be effected at very trifling expense, and presents the advantages of great cleanliness, the ash-pan being withdrawn only at intervals of several days for emptying. The appearance of the fire, however, is in that case much less brilliant than when the hot-air arrangement is added.

In order to test the question of economy, I have passed the gas consumed in the grate through a Parkinson's 10-light dry gas meter, supplied to me by the Woolwich, Plumstead, and Charlton Consumers' Gas Company; the coke used is also carefully weighed.

The result of one day's campaign of nine hours is a consumption of 62 cubic feet of gas and 22 lb. of coke (the coke remaining in the grate being in each case put to the debit of the following day). Taking the gas at the average London price of 3s. 6d. per 1,000 cubic feet, and the coke at 18s. a ton, the account stands thus for nine hours:—

	d.
62 cubic feet of gas at 3s. 6d. a thousand ...	2.604
22 lb. coke at 18s. a ton	2.121
Total ...	4.725

or at the rate of 0.524d. per hour. In its former condition as a coal-grate, the consumption exceeded generally two and a half large scuttles a day, weighing 19 lb. each, or 47 lb. of coal, which at 23s. a ton equals 5.7d. for nine hours, being 0.633d. per hour. This result shows that the coke-gas fire, as here described, is not only a warmer but a cheaper fire than its predecessor, with the advantages in its favour that it is thoroughly smokeless, that it can be put off or on at any moment (which in most cases means considerable economy), that it is lit without the trouble of laying the fire, as it is called, and keeps alight without requiring to be stirred.

It may appear strange at first, that the use of the separated coke and gas to produce a given effect should be fully as cheap as using the raw material combining the two constituents, but the solution may be found in the circumstance that in the case of the coke-gas fire no heat flashes up the chimney, but is utilised entirely for raising the coke in front of the grate to the condition most favourable to radiation into the room.

I hold that it is almost barbarous to use raw coal for any purpose, and that the time will come when all our fuel will be separated into its two constituents before reaching our factories or our domestic hearths. Such a measure will not only furnish us with the complete solution of the smoke question, but would be of great value also as a money saving. In conclusion, I may observe that I have taken up this question without the idea of profit, and shall be happy to furnish builders and others desirous to introduce the grate here described with the necessary indications to insure success.

Mr. Makinson Fox has been re-appointed Medical Officer of Health for the Altrincham Union Rural Sanitary Authority. The members of the Local Board, on the occasion of the election, showed due and gratifying appreciation of Dr. Fox's services during his last term of appointment.

Use MARGERISON'S soap (registered White Windsor), Preston. The best and cheapest Soap in England for washing clothes, or any houshold purpose. In pounds 4½d., squares 2d. Ask for MARGERISON'S Soap, and see that the word MARGERISON is on every bar, as there are so many worthless imitations.—(Advt).

THE OXFORD SMOKE CONSUMING COOKING RANGE.

The Manufacturers and Patentees of this cooking range, Messrs. Dean and Co., Blenheim Foundry, Oxford, claim that it consumes the smoke of the coal used to feed it, and consequently extracts the largest amount of heat from a given quantity of fuel in a simple and effectual manner. In this Oxford Range, the heat starts in the centre of the oven on the top, and diverging to the right and left, meets again in the centre at the bottom, and thus encircling the oven, gives a more uniform heat throughout, making it a most efficient roasting oven; many of its users testifying that the baking is quite equal to roasting before an open fire.

In this range, the bright fire is continually passing away from the newly charged black coal, and does not pass it on its way to do its work, but on the contrary, all smoke from the black coal has to pass through the brightest part of the fire; and this in addition to effectually burning the smoke, brings two other advantages: one is, that there is no coating of soot to heat through, and hence the heat acts on the oven at once; and another is, the flues require much less attention in the way of cleaning out.

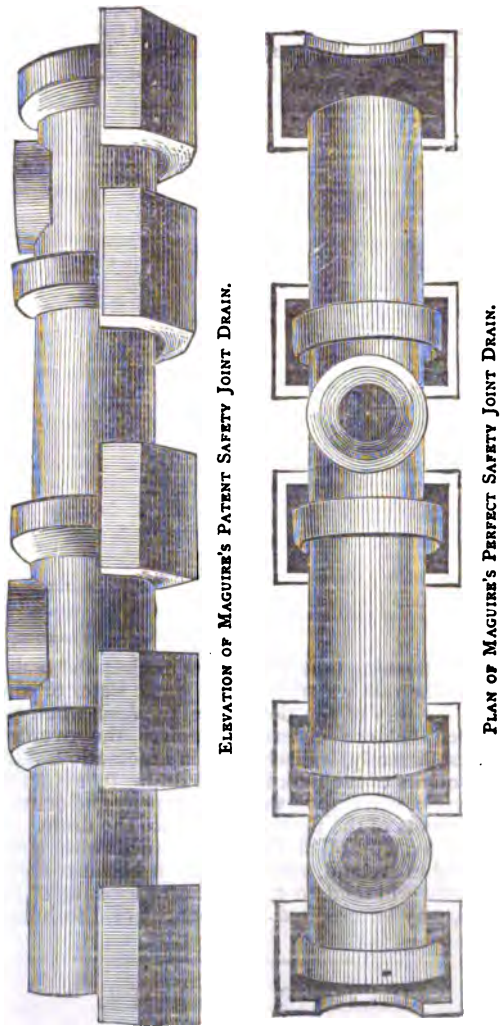
In addition to these incontestable advantages Messrs. Dean guarantee their range to be the cheapest in the market, and so offer a double economy, both in quantity and quality of coal consumed, as well as in the price of the apparatus.

Testimonials, which tend to show the validity of these claims, have been sent to Messrs. Dean, from Union Workhouse Authorities, the Proprietors of Restaurants and Hotels, as well as from many private gentlemen interested, as most of the world is now, in promoting the consumption of smoke and the economy of fuel.

MAGUIRE'S SAFETY JOINT DRAIN, AND SELF-ACTING FLUSHING TANK.

Within the last few years we have seen introduced various improved appliances for the better jointing of house drains, among which may be noticed Stanford's joint, Roberts' joint, and several others. We have pleasure in now taking cognizance of the patent safety joints for drains, designed by Messrs. Maguire of Dublin. The inventors aim at the establishment of a staunch joint, which shall prevent the occurrence of burs in the interior of pipes—and with very little increase of cost upon the ordinary methods of jointing, they have introduced a pipe in conjunction with a hollow cradle of earthenware glazed like the pipe itself—in which the pipe and the socket of the next drain rests. This system of drain pipe laying enables a workman to make a sound joint underneath the pipes to be laid down, by pouring round the first joint which has been made, a liquid cement—on the lower half of the socket—which, after it has been set fast by time, renders the soundness of the pipe joint independent of the workman's care. The patentees also provide for inspection, by means of a loose cover on every alternate length of drain pipe, and by this means the smooth condition of the perimeter of the pipe can be readily ascertained by the client or the operative concerned. In addition to this the patent covers a system of T piece inspections which may be carried up to the ground level if desired, and thus provide for the periodical inspection of the drains which underlie the basement of a house. These are supplied with air-tight stoppers in the most approved fashion.

The improvements introduced by the patentees consist mainly in the cradles devised by them for holding the pipes in sound concentric order. And not the least to be observed in their favour is the fact that the cradles are equally applicable to any of



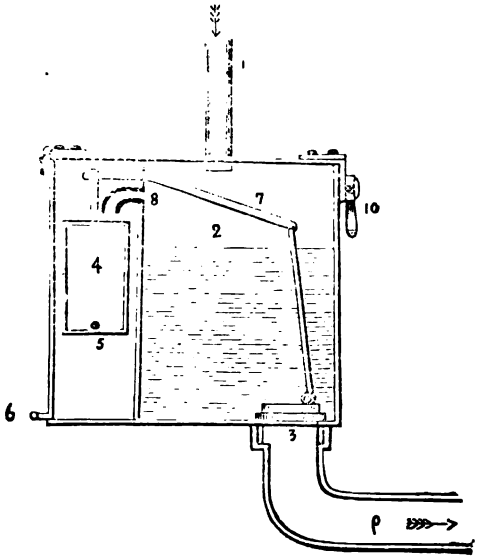
Elevation of Maguire's Patent Safety Joint Drain.

Plan of Maguire's Perfect Safety Joint Drain.

the various orders of pipe drains now extant. All that is necessary is to be certain that they fit the cradles which have been invented by the firm, and that they allow of a second joint to be made outside the ordinary joint. There can be no doubt that this patent joint is an advanced step in the direction of a sound and staunch jointing of underground drain pipes, and is especially applicable—provided proper curves are found—for many disabilities now due to the ordinarily connected pipes. And in these days when practical sanitarians are eager to test every offered device, for soundness' sake, and are even reverting to iron pipes, such as are used in water and gas mains, with purest lead caulkings, the system inaugurated by Messrs. Maguire deserves a thorough trial.

It has always proved a difficult matter to provide for properly flushing out a drain in cases where the Water Companies object to allow of a proper and special supply for that purpose, and to compass this end many contrivances have been set in action. The

tumbling hopper which, after a certain collection of water overbalanced itself and discharged its aggregate contents into the drain, was an early solution of this difficulty, and since the introduction of this primitive system of periodical flushing out of the drains and house services, many improved contrivances have been brought out, chief among which is Field's self-acting flushing cistern. The tank of Messrs. Maguire serves a similar purpose.



In the flushing tank now under notice, the tank 2 collects the rain water, the bath waste water or sink water, by way of the down-pipe 1. And when the provided balance cistern 4 receives the overflow water sufficiently, it discharges in automatic fashion the contents of the tank into the drain, by actuating the lever 7, whereupon the valve 3 opens and delivers the contents of the tank full bore into the drain.

This system of flushing has met with great approval in Ireland, and we notice it because everything that will tend to a periodical cleansing of the drains, may be credited as a benefit of the householder.

DIETETIC NOVELTIES.

SCALLY'S SWAN AND CROWN WHISKY.

Our attention having been drawn to the maddening effect produced on the drinkers of so-called Irish Whisky in the East-end of London, some few years since, we caused samples of this spirit to be procured from ten public houses in the Whitechapel Union district for the purposes of analysis. These analyses, published in the SANITARY RECORD of March 2nd, 1877, proved that these spirits were not in all cases whisky at all, being, in a few instances, compounded of coarse German spirit artificially compounded and flavoured. Other samples were true Irish whiskies of a coarse type, but filtered and doctored in various ways known to skilful adulterators, and loaded with fusel oil in deleterious quantities. The maddening effects of fusel oil are well known, and it is, unfortunately, but too certain that many of the sudden outbreaks of violence, so often seen in the lower orders of the population after drinking spirits, is quite as much due to the quality as the quantity of the stimulant they have been imbibing. Nor are these deleterious influences confined to the lower classes only; it is well known that much whisky is sold for ordinary consumption which has not been given the time to ripen, and in which the fusel oil has not had time to mellow into harmless compounds. Various devices of 'blending' old whiskies with new are adopted, even by highly reputed firms, and then the compound is sold under a sort of average computation, as 'old' or 'very old', while still containing a good deal of new whisky, in which the raw products of recent distillation are not removed by the process of time, but only masked. This process is delusive and wrong. Age of the whole body of the whisky is what is to be desired for digestive and sanitary reasons — for the true requirements of the table as well as for the prescription of the physician. To ensure this desideratum, Messrs. Scally and Co., of Eustace Street, Dublin, and 39, Lombard Street, London, E.C., have adopted the following system of registration and supervision. They bottle their whisky in bond, under supervision of the Customs' officers, and label it also in bond, with a numbered serial label under the same supervision; each label bearing the date of age of the whisky as well as its serial number. Thus, the purchaser can choose his whisky of any age he pleases, and get it with an absolute government guarantee from Messrs. Scally or their agents; a system, so far as we know, unique, and calculated to afford absolute security to those who require a wholesome stimulant, whether for therapeutic or dietetic purposes. The Swan and Crown whisky is of very fine quality, and is, we feel sure, destined to achieve the commercial success to which it is entitled.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, December 17th, at 7.30 p.m. The Council will present a report on the following subjects:—1. A communication from the Charity Organisation Society respecting the Dwellings of the Poor. 2. The desirability of the duty of investigating cases of deaths, uncertified by a Medical Practitioner, devolving on a Medical Officer of Health. Dr. W. Ogle, General Register Office, Somerset House; and Dr. J. W. Reid, Director General of the Medical Department of the Navy, will be balloted for as Honorary Members. Dr. W. W. Stainthorp, Medical Officer of Health for Wareham, will be balloted for as an extra Metropolitan Member.

Members are invited to introduce short communications on sanitary subjects for discussion, to which the evening will be devoted. The following subjects have been promised:—Dr. W. N. Thursfield will make some observations on the Sanitary Supervision of Cow-sheds, Dairies, and Milk-shops, and will move the following resolution (postponed at the last meeting):—'That in the opinion of this Society it is desirable, having regard to the more effectual prevention of the spread of zymotic disease by the agency of milk, that the special sanitary supervision and inspection of cow-sheds, dairies, and milk-shops, should form a part of the duties of the Medical Officers of Health, and the Sanitary Inspectors of the respective districts.' A short communication by Dr. B. Browning, on 'Some Points respecting the Death-rate of Children in London and elsewhere.'

ORIGINAL PAPERS.

A SERIES OF REPORTS ON SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

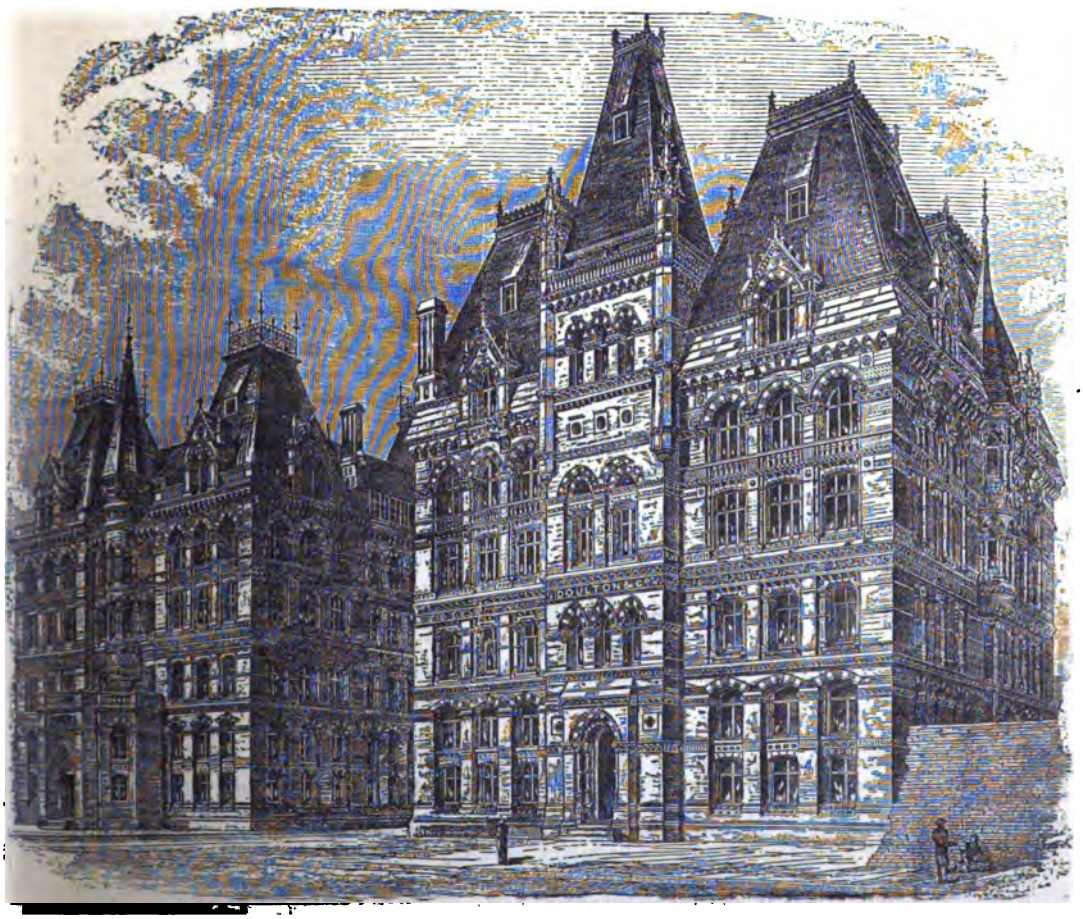
BY OUR SPECIAL COMMISSIONER.

I.

SANITARY science and practice are under a deep debt to the potters for many of their most vital and important advances in recent times. The debt is, perhaps, reciprocal, for the demands of sanitarians have, on the one hand, done much to give renewed importance to pottery products, while, on the other hand, the enterprise, skill and ingenuity of the potters of our generation have furnished to sanitary engineers an immense variety of efficient products, without which modern sanitation would be far less efficient than it now is. In the first rank among those who have obeyed the impulse of science, and intelligently profited by its suggestions, is the firm of Doulton. The variety, the extent, the excellence, and the utility of their productions are universally known, and they have erected at Lambeth works and museums which are a credit to British industry in a utilitarian sense, as well as in an artistic point of view. The range of their sanitary products can hardly be fully estimated by any but those who have taken occasion thoroughly to examine their sanitary museum, in which all the departments of sanitary pottery are represented by numerous products, many of them of interesting novelty, and all of them of a high standard of industrial merit. Their artistic and decorative terra-cotta for building purposes, as for the highest art objects, is quite new, unrivalled, and unique in the history of pottery.

After a thorough inspection of their museum, library, and factories, a review of their establishment, and of its principal sanitary products, will have a considerable practical interest for Sanitary Engineers, Medical Officers of Health, and Builders, and for all who are interested in public health works, whether for towns, public buildings, or houses. This review we commence to-day in a series of articles, which will be fully illustrated, and which will serve to delineate the main features of a sanitary exhibition, of which we recommend to our readers a personal inspection. This series of articles will, we believe, be found to be of great and wide interest, and of no small practical value, as illustrating one great department of practical sanitation.

The parish of Lambeth has long been famous for that which now forms its staple manufacture. We find that two hundred years ago workmen from Holland settled here, and introduced the manufacture of delf ware into potteries, which up to this time had been largely occupied in the production of salt-



MESSRS. DOULTON'S WORKS AND SHOW-ROOMS, ALBERT EMBANKMENT, S.W.

glazed stoneware. Salt-glazed stoneware was produced extensively in Staffordshire about 1730 or 1750, and Professor Church had recently many of these specimens in his possession; but later on, the manufacture of salt-glazed ware in Staffordshire had died out, and Lambeth, Bristol, and Fulham alone were left as centres of this industry. In 1820, there were but sixteen small kilns, producing ware to the value of about £300 weekly. The progress of sanitary science, however, brought with it a revolution in the potter's art. Existing kilns which had long lain dormant, or were partially worked, were found insufficient to meet the demands of sanitary science, and there arose fresh candidates for public favour. Foremost among these was the founder of the present firm, Mr. John Doulton, who, sixty-six years ago, commenced trade as a potter in Lambeth. It is now thirty years ago since this firm introduced the manufacture of stoneware pipes for house and street drainage, and soon the excellence of manufacture and the value of their inventions in all that concerned sanitary work, placed them in the foremost rank as manufacturers of sanitary appliances, as well as of the various other kinds of pottery.

To give some idea of the gigantic machinery required to meet the exigencies of their trade, we may mention that the works of this firm at Lambeth alone, not including the new and elegant structure which has been erected on the Albert Embankment, cover seven acres of ground. In 1878 the number of persons employed in their various works amounted to 1,600 hands, and the quantity of clay and raw material prepared during the year was 125,000 tons, and the steam-power employed about 800 horse-power, and in the same period 48,500 tons of coal were consumed.

As each demand has arisen this firm has applied itself to meet it, often taking the initiative. It has been found necessary to add factory to factory, until at last has sprung up in different parts of the country no less than eight large works, in which are produced a multitudinous variety of pottery goods, artistic in design, and of utilitarian and economic value, comprising articles of general stoneware, terra cotta, architectural terra cotta, Doulton ware, sanitary goods, sanitary appliances, chemical apparatus, etc., etc.

At Rowley Regis they have two large factories, two at St. Helens, and one at Smethwick, while their pipe works are the largest in the world. In the present instance we cannot do more than give a description of the new and handsome pile of buildings which have been erected on the Albert Embankment, which forms the subject of our illustration.

The building consists of two large blocks and a fine chimney-shaft erected on a blue Staffordshire brick foundation, faced with Fareham red bricks, with red and buff terra cotta dressings. The buildings, which are nine stories in height, are designed in the modern Gothic style, freely treated, and are richly adorned with mouldings and foliation; while with the terra cotta are interspersed columns, panels, bosses, etc., of salt-glazed coloured stoneware, known as 'Doulton ware'.

The first block contains a spacious show-room on the ground floor, which is entered through a vestibule from the projecting porch, supported on large columns in 'Doulton ware'. A portion of the first floor is also used as a show-room, and as a library and reading-room. The library contains a well assorted collection of sanitary and engineering works, which are best calculated to be helpful for ready reference, and of authoritative value. The engine-room and boiler-house are situated in the basement. The remaining stories of this block are devoted to the extensive requirements necessary for the manufacture of sanitary fittings of every kind. Water-closets and lavatories are here shown with all the latest improvements in full working order.

The second block is devoted entirely to the manufacture of terra cotta and the Lambeth faïence and Doulton impasto, the latter two being the last introductions in art-ware brought out by this firm. The 'Doulton ware' (the other branch in their art-manufactures), requiring different manipulation, is carried on in the High Street premises. The engine and boiler-house and the large clay-room and stores occupy the ground floors. The entrance and main staircase are placed in the tower, which, properly, forms the central feature of the elevation of this block, and gives access to the various workshops, and also to the studios at the top of the building. These studios are replete with every convenience, and have attached to them cloak-rooms, dining-room, and museum for the use of the artists employed. The central compartments of this block are devoted to drying-rooms, on a plan specially designed and used by Messrs. Doulton's firm, which enables them to produce their works with much greater rapidity than has hitherto been attempted, and renders them to some extent independent of our varying climate.

The chimney-shaft adjoining (which is not shown in the view) is built to carry off the smoke from several new kilns erected in connexion with the second block. It is built on solid concrete, 10 ft. thick and 25 ft. square, laid on the Thames gravel 17 ft. below the ground-line; the solid brick foundations on the concrete are 7 ft. deep and 17 ft. 8 in. square; the shaft itself is square on plan, with a circular chimney of 9 in. brickwork carried up inside for the first 50 ft. in firebrick. This shaft is six ft. in diameter for 150 ft., diminishing in the next 50 ft. to 5 ft. 3 in. diameter, and is thence parallel to the top. Of the hollow spandrel corners, one is formed into a staircase of communication with the gallery near the top by means of foot-irons, 2 ft. long, laid so as to turn spirally one turn in every 6 ft.; a 4½-in. air-space is left between the inner and outer shafts. The total height above the top of the concrete is 233 ft. The red brick shaft above the second weathering of the base shows 87 ft. 6 in. of clear brickwork, diminishing from 12 ft. square to 9 ft. square under the corbels of the balustered gallery; the terra-cotta shaft showing above the gallery is 31 ft. high. Two copper lightning conductor-bands are connected with four bands carried completely round the top of the shaft, and these have two points above the balustrading, and two points above the top of the chimney.

Altogether, this group of buildings forms one of the most prominent features on the south side of the Thames, and is certainly one of the attractions of the Albert Embankment.

Messrs. Doulton's manufactures include Glazed Stoneware Drain-pipes of all descriptions and every known kind of sanitary appliance: to enumerate them singly would be to give a lengthy catalogue, for which, though valuable in itself, we can scarcely spare the requisite space. We therefore refer our readers to Messrs. Doulton's voluminous list of their sanitary wares, and at the same time recommend an inspection of the most extensive and useful collection of all sanitary appliances to be found in the civilized world.

ON THE DISSEMINATION OF INFECTIOUS DISEASE BY MILK.

WITH SUGGESTIONS FOR ITS MORE EFFECTUAL PREVENTION.*

By W. N. THURSFIELD, M.D.,
Sanit. Sci. Certif. Camb., Medical Officer of Health Shropshire Combined Districts.

INSTANCES of the diffusion of wide-spread epidemics of infectious disease through the agency of milk have become so common of late, or perhaps, to speak more correctly, have recently been so much more frequently recognised, that their effectual prevention is a matter of the highest importance; and whilst I do not intend to criticise the advice of late so widely given that, in order to prevent such attacks of disease, all milk should be boiled previously to being used as food, I am decidedly of opinion that we ought to go a step further back, and see if we cannot in the first instance prevent the contamination of milk by disease germs. There are certain circumstances under which, when the individual members of a community cannot well protect themselves, it is recognised to be the duty of the State to furnish as far as possible the necessary safeguards. This principle, as applied to milk, has already been endorsed by our Legislature, and acted upon in Sec. 34 of the Contagious Diseases (Animals) Act, 1878, and by the Order in Council of July 1879 founded on the above section, and known as 'The Dairies, Cow-sheds, and Milk-Shops Order'. I propose now to bring under notice the practical working of this legislation, with a view of considering what measure of protection is afforded by it to the consumer against the risk that, with milk, the germs of disease may be introduced into households. I think the answer must be, not only that it affords no sufficient protection, but that in those districts from which disease has been most frequently so imported, the risk is in some respects greater than before such legislation, and the reason I believe to be that this important matter, instead of being placed prominently under the operation of the laws relating to the health of mankind, has been made to occupy a very secondary and subsidiary place amongst the statutes relating to diseases of animals.

It may be said that officials have nothing to do with legislation, but should make the best of things as they find them. Whilst agreeing in the main with this axiom, I would submit that the present is an exceptional case, as the public, guided probably by common sense ideas of the fitness of things, whenever milk has been proved to have conveyed infection from one district to another, invariably appear to blame the sanitary officials of the district from which the disease was imported; whereas, as a matter of fact, the statutory duty of enforcing the necessary measures of isolation in outbreaks of such diseases as scarlatina, diphtheria, or typhoid fever, in dairies, etc., has been so far taken out of the hands of Medical Officers of Health and Sanitary Inspectors, by being made the subject of special legislation, which places the inspection and control in such cases of dairies, cow-sheds, and milk-shops in the hands of Inspectors under the Contagious Diseases (Animals) Act.

The Local Authorities for the administration of the above Act are various, but (with the exception of that part of London under the control of the Metropolitan Board of Works, and to which I shall not again refer, except as receiving milk consigned from other districts) the whole of England may be broadly divided into districts (boroughs), in which the Local Authority for the administration of the above Act is necessarily the *same* body as that which administers the laws relating to human public health, and districts (non-corporate) in which the Local Authority is the Court of Quarter Sessions, and the two Authorities are necessarily *distinct* bodies. It is to these latter districts that I propose solely to refer on the present occasion, because from such districts, in which almost all rural districts are included, it is that disease is most frequently consigned in the milk-tin, and that in fact where protection is most needed it is least afforded. Speaking as an Urban Medical Officer of Health, of what use is it for such officers to influence the various corporate bodies with which they are connected, to adopt stringent regulations with reference to milk-shops, etc., in their respective towns, if no efficient supervision is exercised in the districts from which the milk is consigned? Now, why is this? Is it because in these (for the most part rural) districts, the Local Authority is a distinct body from the Sanitary Authority, or is it for some other reason? I believe the latter, and that, having regard to all the circumstances of the case, the present Local Authorities are preferable to any other likely to take their place in this matter; but that the failure is owing to the fact that the carrying out of the provisions of the Legislature has devolved upon officials who are not to be blamed if they have failed to comprehend the importance of and the method of doing certain things requiring considerable technical knowledge, but for which they have had no technical training whatever.

The executive for carrying out the Contagious Diseases (Animals) Act are, by the provisions of the Act, police officers who have the power of calling in Veterinary Inspectors, a machinery doubtless admirably adapted for the main purposes of the Act, viz., the prevention of the spread of cattle plague and other severe epizootic diseases. Local Authorities have power to appoint other and special Inspectors, but, speaking from the results of a very widely extended inquiry, such appointments are found to be most exceptional.

Before proceeding further, it will be well to give a short *résumé* of the requirements of the Dairies, Cow-sheds, and Milk-shops Order, 1879, which have to be enforced by the Inspectors; these are shortly, that every dairy, etc., shall be provided with proper water-supply, and so drained, etc., as to obviate the risk of contamination of the milk by means of sewer emanations or in other ways, and that on the outbreak of any infectious disease amongst the employés, precautions shall be taken to enforce isolation of persons who are infected from milk, 'until', to quote the words of the Order, 'in each case all danger therefrom of the communication of infection to the milk, or of its contamination, shall have ceased.' Now, with reference to these requirements, everyone must admit that if there is anything in the application of trained knowledge to structural works of drainage, or in the application of medical science to the prevention of disease, the sanitary officials of the district are not only the proper persons, but the only persons to whom such duties should be entrusted. As a rule, the eye only sees what it has been trained to see, and the mind only appreciates what it has learned to appreciate; a police officer, or indeed any officer, however zealous and intelligent, could not without previous training know if a place where milk was kept was drained with precision, and how could he appreciate the precautions 'necessary to ensure the absence

* Read before the Society of Medical Officers of Health, December 17th, 1880.

of all danger of the communication of infection to milk', and his opinion as to the goodness or otherwise of a water-supply would probably not be different to that of any other non-technically educated person.

I recently met with an instance in which the pump well on the premises of a large milk selling establishment was condemned by the Medical Officer of Health, as being obviously liable to a variety of sources of contamination of the worst kind. The matter was then officially reported to the police-sergeant, who is the dairy inspector for the district. This functionary visited the premises, and gave it as his decided opinion that the water was all right, and with this the matter rests, as the sanitary authority are advised (and probably rightly from a legal point of view) that the initiative in taking action rests with the inspector under the Contagious Diseases (Animals) Act.

To take another very practical point, it is my experience in a very large number of epidemics of diphtheria (and the same remarks apply to some extent to scarlatina and typhoid fever), that the most fertile centres of infection are very slight cases of the disease, unattended by a medical man, and probably called by the mother simply a cold. Now, although a milk inspector has powers of inspection and entry denied to Medical Officers of Health, how can he be expected rightly to appreciate the significance, say for instance, during the prevalence of diphtheria, of two such slight cases of sore throat in one family?

It may be said that, by being placed under such jurisdiction as I have described, a dairy does not cease to be a private house for the purposes of the Sanitary Acts. To a certain extent this is true, and is the view that I myself have practically adopted in my course of action in such districts, where I have frequently stopped the sale of milk, using merely the prestige of my office rather than any legal power; but it is, nevertheless, undoubtedly true that in making any trade or calling the subject of special legislation the legislature has indicated to what jurisdiction the calling or building is primarily responsible, and under what Act, and by whom, proceedings will have to be taken; and if it became necessary to take proceedings with the view of stopping the sale of milk which was presumably infected, the Medical Officer of Health could only do so by calling in the Contagious Diseases (Animals) Inspector. In this respect we are even worse off, in bad cases, if prompt action is necessary, than before, as a few years ago, on one occasion, a milk-seller having declined to discontinue the selling of milk which had been undoubtedly exposed to the infection of scarlatina, I immediately had the milk seized as an article of food that was unsound and unwholesome, and on my evidence to that effect a conviction and fine ensued. If the popular view were correct that it is from the diseases of animals themselves that the infections noticed above are conveyed to mankind, there would be some good and sufficient reason why the control of cow-sheds, and milk-shops, and dairies should remain as at present. I wish to avoid opening up the large and important question of the connection between certain animal and human diseases, and will only say that medical men are not likely to overlook the importance or probability of such an occurrence. This principle is already recognised in the legislation relating to diseased meat, and whatever alteration might be made with regard to milk and supervision, the machinery for carrying out the main provisions of the Contagious Diseases (Animals) Act would still be available for consultation if desirable. As regards, however, the question of those diseases to which I chiefly refer, viz., scarlatina, typhoid fever, and diphtheria, I can speak from my own practical experience, and in the several cases in which I have found strong evidence that dissemination had occurred through milk, it has always also appeared that the milk had been liable to contamination, either directly through persons suffering from outbreaks of the same disease, or indirectly through sewer emanations or water charged with the specific infective element of the disease, for which the milk may also have acted as a cultivation fluid.

It may be objected that to place dairies in all districts under the same strict supervision as obtains in large towns would unnecessarily and in a harassing degree interfere with many people. Of this I do not think there would be any fear, and the Order specially exempts those who sell milk only in small quantities to workmen or neighbours.

The making and framing of regulations is optional with Local Authorities, and certainly those relating to cow-sheds in a large town would be in many respects unnecessary in a rural district. What is wanted is not so much regulations as efficient inspection, and above all efficient advice under certain exceptional difficulties. Every milk-store should be drained with precision, the water-supply should be free from liability to sewage contamination, and on the outbreak of infectious disease in the families of any of those employed in connection with the dairy or the milk, the best advice as to isolation should be obtainable. In all these respects certainly the dairy proprietors would be gainers.

One word in conclusion. The country may not be ripe for the compulsory notification of infectious disease, though the principle of this is already recognised in the case of lodging-houses, and having regard to the respective power for evil of the two places, how much more is it necessary in the case of dairies. Notification of disease need not, for obvious reasons, involve publicity, but in such cases the responsibility of the necessary isolation could only devolve on the Medical Officer of Health.

I believe, indeed, inspection may be so carried out that the Inspector would come to be looked upon, not as an interloper only borne with so far as the law demands, but as one in a position, under certain circumstances of disease incidence, to give advice, valuable from a commercial, as well as from a domestic point of view.

The Chapter of the Order of St. John of Jerusalem has awarded its bronze medal for saving life on land to Mr. James M'Gowan, Inspector of roads for the borough of Birkenhead, for going down at great personal risk into an underground passage, and rescuing three men who had been rendered insensible by noxious gases, one of them dying directly he was brought by M'Gowan to the surface.

The efforts to obtain a supply of good water for Cromer have at length, after many and great difficulties, been crowned with success. Continuous pumping has now been going on at the works for seven weeks, without being able to reduce the level of the spring—indeed, the difficulty has been to keep down the water in the well by means of the main pumps.

Use MARGERISON'S soap (registered White Windsor), Preston. The best and cheapest Soap in England for washing clothes, or any houshold purpose. In pounds 4½d., squares 5d. Ask for MARGERISON'S Soap, and see that the word MARGERISON is on every bar, as there are so many worthless imitations.—(Advt).

NOTES ON THE SPREAD OF DIPHTHERIA.*

By Edwyn Slade King, M.D.,

Licentiate in Sanitary Science; Medical Officer of Health for Ilfracombe, Torrington, and Dulverton districts.

The prevalence of diphtheria, ever since the beginning of the sixteenth century, in every region of the old and new world—its large proportional fatality, its probable recurrence in the same individual the hereditary susceptibility to its attacks, the rapidity with which it often strikes down its younger victims—the hidden pathways along which it glides from one home to another, passing by the hovel where sanitary neglect seems to claim it as an expected guest, and knocking with a hand which admits of no denial at the cleanest upland homestead—fix the attention of the student of preventive medicine, and render its etiology a matter of no slight interest.

That one sick child may infect an entire household; that its poison may be smuggled in clothing; may be meted out by our milkman in his daily rounds; may steal on us shrouded in the gases of our sewers; that it may cling to the floors and walls of empty chambers for days or even weeks—are but two well recognised facts. Indeed, I remember where within one of my sanitary districts the farewell kiss impressed on a coffined corpse proved the kiss of death to a group of unsuspecting Sunday-school children.

Neither the season of the year, nor excess or deficiency of heat, bear any relation to the spread of diphtheria, and its connection with rainfall is assumed rather than proved. If we extend our inquiry into the propagation of diptheria over any wide area, we shall soon observe that the majority of those suffering from its attack are children, and that the most impure and over-crowded habitations quite as often escape as the cleanest and best ventilated; in fact, that it is not on sanitary conditions that its primary visitation at all events depends. No doubt that when diphtheria is once fairly established among a swarm of ill-fed, close-packed, unwashed youngsters, they will die faster and spread infection further than more fortunate children; but these are only the accidents which result from overcrowding, want of control, bad nursing, and all the attendant ills of thriftless poverty.

But the isolated position of a house, and its distance from an infected centre, render it no more secure from the advent of diphtheria than the cleanness of its surroundings might be expected to do. This disease leaps with long strides from one dwelling to another, miles apart, leaving the inhabitants of the intervening hamlets and cottages untouched. The only reasonable explanation seems to be that the atmosphere becomes contaminated by contagia from the bodies of the sick, and that currents of air carry the poison with them in their course. Bretonneau, indeed, opposes to this theory the weight of his great authority, for he says, 'it (diphtheria) no more possesses this property than the syphilitic disease does'. And in another place, 'the facts supplied by the epidemics of diphtheria which have broken out in the department of Indre et Loire, or which have extended into the surrounding departments, prove in the most evident manner that the atmosphere cannot transmit the contagion of diphtheria'. William Squire, however, admits that, to some extent, the material of infection must be diffusible in the air, and that within the limits of a house the danger of infection is greater from this source than from direct contagion. I venture to think that he understates the facts, and that the miasm of diphtheria travels far along the course of prevailing winds. I relate the following as an illustrative case:—On the morning of June 6th, 1879, the household of a farmer living at Warnscombe Farm, North Devon, were in perfect health. Their milk-supply was derived from their own healthy cows; their drinking-water was excellent; they used neither drains nor cesspits, simply a detached earth closet. The building stands more than a mile from any other, on the sloping side of a grassy hill, commanding delicious land and sea views, and is blown on by every wind except the north-east. Three of the children were absent from home for a few hours on this day, walking a distance of a mile or so towards the sea-board, and returning home direct—neither entering a dwelling-house nor conversing with strangers. At nightfall, two of them complained of illness. The next morning diphtheria was recognised by their medical adviser, and on the fourth day the youngest, aged seven years, died. The illness was made known to the local sanitary authority from the commencement; and, in conjunction with the medical man in attendance, the most stringent precautions were used to limit the spread of infection—providentially with good success. I instituted a most searching inquiry, both within my own sanitary districts which surround the house and in the adjoining parishes, to discover a source of infection, and could find none nearer than in a village eight miles away, where, in a detached house, two cases of diphtheria had occurred not long before. The tenant of Wharnscombe, a most intelligent yeoman, who took the greatest interest in the matter, assured me that there could have been no possible intercommunication.

The behaviour of diphtheria during an epidemic which occurred at Ilfracombe in 1873-4 affords a further illustration of its aërial spread. Certainly for ten years previously, and for a much longer period probably, no case had been noted in the town or district, when, on April 21st, 1873, the death of a child aged four years was registered 'diphtheria, membranous exudation on the fauces', thus leaving no doubt of the nature of its illness. The house in which the child died is a small hovel, a few feet above the sea-level, situated in a very sheltered position, adjoining the poorest and most crowded part of the town. No special sanitary precautions were used except the separation of other children and the rest of the household from the sick child. The windows of the room in which it lay were closed, certainly through no theory of air infection—and ventilation was carried on by means of the upcast draught of a wide open fire-grate. The corpse was early placed in a secure coffin and buried. More than six months passed by, and no fresh case occurred.

In the following November there were some cases of diphtheria on board a training-ship in a distant port, and a lad named Prust, aged 13 years, was sent home ill to Ilfracombe. He was received by his aunt, housekeeper to an elderly lady, who resided in a large roomy house, part of a terrace overlooking the town some two hundred feet above the sea-level, and open to the fields front and rear. A medical man, who chanced to live next door, was called to see the boy, an hour or two after he came home, and recognised diphtheria; on the third day the lad died. His aunt, 'to avoid making a fuss', as she called it, and dreading her mistress' displeasure on her return home—neglected every sanitary duty, aired the sick chamber with open windows, and removed the corpse

* Read at Exeter: Sanitary Congress, 1880.

on the evening of death to a relative's house, in a hastily-constructed shell.

This house was unfortunately nearly the highest in the town. Twenty-four hours had hardly passed before two of its inmates, young children, were infected. They were carefully kept within doors, and all communication with the outside world prevented so far as might be. Four days afterwards, three children, aged four, five, and eight years, living half a mile west, straight down the course of the then prevailing wind, were fatally attacked with diphtheria. The same medical man was not in attendance on them; the milk-supply was separate; and their isolation was satisfactorily proved, as they were just recovering from measles, and had not quitted their own roof for the previous three weeks, except to take an airing in the garden. In fact, the medical certificate of death in the case of the first child is 'measles—diphtheria'.

In a day or two more, the children of a country wheelwright were attacked, three fatally, with the same disorder. His house is two miles from the town; is isolated on the top of a blowy hill (700 ft.) surrounded with upland pastures, sloping down to the coast-line. During a portion at least of the preceding week the wind had blown in the direct line from the home of the last group of cases over this man's house. Two of his children, aged two and four years, were out of doors, well enough, in the daytime, and were attacked in the evening with hoarseness, pain in swallowing, swelling of the throat and palate, 'primary laryngeal diphtheria', and died within a few hours of each other. From these multiplied centres of infection the disease spread. To check all communication from house to house was impossible, and by the time this outbreak had ended, more than 125 cases had been under treatment, and thirty-two children had died.

Now, in the case which occurred in April 1873 it is true that no great attention was given to sanitary and preventive measures, and I am informed that the only antiseptic treatment adopted was the local use of potassium permanganate; still, from the *low level* of the dwelling-house, its very sheltered position, the almost accidental closure of the windows, and the early sepulture of the body, the germs of the disease could not mingle, to any great extent at least, with the currents of the air, and the poison failed to spread. No sooner, however, had diphtheria been imported into a house *on a high, exposed situation*, and the corpse been carelessly moved from place to place, than clouds of disease germs were set free into the air; were driven down the wind, and soon found their way on to the mucous surfaces of children. It will be observed that in the three examples of supposed aërial infection separate groups of children were attacked together, group by group, and that in two instances at least local lesions were first noticed, and were prominent till death took place. In fact, the relatives described the children's illness by using the expression 'that they were suddenly struck down with croup in the throat'.

On April 15th, 1878, a sporadic case of diphtheria again made its appearance in Ilfracombe. It occurred in a very sheltered situation, some 90 feet above sea-level. Warned by the consequences of the preceding outbreak, early information was given to the local sanitary authority. From the very first day, the sputa, the excreta, the linen, the throat, were in various degrees all carefully disinfected. Some attempt was made to disinfect the air of the sick room. The attendants employed either hydrogen peroxide (10 vol.) or potassium permanganate to their own hands and throats, and directly the child died she was enveloped in cotton wadding soaked in carbolic acid. The windows were kept closed, and ventilation was carried on by an open chimney and large fire. The infection extended only to the next row of houses, causing, in all, but three cases and two deaths.

I have now before me a diagram, which I prepared in 1874, showing the distribution of diphtheria in the Ilfracombe district during this epidemic of 1873 and 1874. It takes the form of a sketch map, and furnishes, among other particulars, the height above the sea line of the houses where this disease prevailed; now reference to it shows that out of thirty-two deaths, twenty-six occurred in houses on high levels. There is no exact record of the distribution of non-fatal cases, but in a report which was made at the close of the outbreak I find I used these words: 'The residences of nearly all the sufferers are on high levels'; and a medical friend remarked, 'I do not recollect having attended a true case of diphtheria below the level of the south side of the High Street of Ilfracombe'.

In the year 1873, Ilfracombe contained a population of 5,000 souls—some 3,000 in round numbers living on the lower levels, and the remainder in elevated situations, corresponding to the ecclesiastical divisions of the parish. Yet, though the population then preponderated so much on the *lower* levels, and the houses were so much closer packed and far the oldest, they were comparatively free from the epidemic which hung round *higher built* houses. Neither milk, water, nor drainage cast any light on the cause.

The author of the *Dictionary of Hygiene** speaks of the same epidemic as extending into the districts of which he then was the health officer; he says, 'The fact of its preference for high, open, and airy situations was extremely marked, places of selection being isolated houses on lofty hills. It was propagated also into houses where there were certainly no insanitary conditions whatever.'

Observations made during a single epidemic, however carefully recorded, are far too limited to prove that air is a carrier of the material of diphtheria poison, be its nature what it may. There may be better explanations of the phenomena I have described. The problem to be solved is this—Is diphtheria a disease generated *de novo* in healthy children, under certain circumstances of which we are entirely ignorant, or is it only communicated by contagion and infection in the widest use of these terms?

If this doctrine of communication be, as it most probably is, the true one, is air one of the communicating channels; and, if so, under what special circumstances?

Of the transporting power of air, we have the well-known illustration of sails of ships, 800 miles away from the African coast, being red with minute particles of sand, which lodge on them after a sandstorm on that continent. Some ingenious experiments of Mr. Blackley† may further explain the initial appearance of diphtheria on high levels, and its wider spread from such places. Blackley not only estimated the amount of pollen dust floating in the air, by exposing slips of glass moistened with a mixture of proof spirit water, glycerine, and carbolic acid, but he also determined the amount of pollen at different altitudes, by flying kites, to which prepared slips of glass were

* *Dict. of Hygiene*, p. 186, art. 'Diphtheria', 1st Ed.
† *Hay Fever, or Hay Asthma.* By C. H. Blackley. London: 1873.

attached, and by these means has ascertained the interesting fact that there is more pollen in the upper than in the lower strata of air. In one experiment a breeze had been blowing for twelve hours from the sea, and a kite with a glass attached to it was elevated to the height of 1,000 feet; a similar glass was exposed at sea-level; after three hours' exposure, the kite glass showed eighty pollen grains, the one at the lower level not more than one or two.

The local condition of the atmosphere may have much to do with the vitality and perfection of diphtheria organisms, as well as their distribution, as in the case of the potatoe blight *(peronospora infestans)*, whose ordinary aërial fructification depends for its perfection on fractional differences in the proportion of carbonic acid in the atmosphere, and the presence or absence of the sun's light-giving rays.

With three if not four forms of infectious fever are associated the presence in the tissues of abnormal forms of vegetation, which, first discovered by continental pathologists, are confirmed by the conscientious experiments of Dr. Sanderson. Professor Cohn has proved them to be spirilla, of the class algæ or sea-weed. In the case of diphtheria, Dr. Oertel, of Munich, considers the primary disease to be local, and Letzerich is confident that it is caused by a fungus which attacks mucous surfaces from the outside. Dr. Von Naegeli classes these microscopic organisms or micrococci in a group which he connects with fungi.

Now algæ will be more closely connected with the aqueous propagation of diseases, but every botanist will place the fungi as aërial in their fructification. Thus air would be the natural agent for the diffusion of these fungoid microzymes or cacozymes, as Dr. Alfred Carpenter proposes to name them.

Is primary diphtheria a local or a constitutional disease? A large portion of its history is an attempt to solve this vexed question. If the theory of aërial propagation by cacozymes be true, local symptoms would first show themselves. The rapid progress of the disease renders the separation of local from general symptoms difficult, but the history of the cases I have recorded certainly favours a local view of infection, both from the incidence of the disease and the early attention which was attracted to the throat; and again, if a careful daily examination is made of those who nurse diphtheria patients, in a great number of cases patches will be noticed on the tonsils and adjacent surfaces. In the event of adult attendants, these patches generally pass away without further mischief, without treatment, and without even the knowledge of the person concerned.

To practical sanitarians the methods by which diphtheria can be propagated are questions of the greatest interest; and should multiplied cases be recorded where isolation seems certain, and yet the disease spreads—and, on the other hand, where air poisoning is obviated and the disease is checked—we may fairly consider that the atmosphere carries diphtheria in a way somewhat similar to the water-spreading agency in typhoid.

It may chance to be near the truth that diphtheria is an air-spread disease, and that the mucous surface of the throat and parts that lay adjacent are proper for the initial growth and fruiting of its special fungus; just as in the case of enteric fever, the mucous surfaces of the intestines are proper for the life of the typhoid fungus, which is water-born and water-spread.

LONDON SMOKE AND FOG.

By FREDERICK EDWARDS, JUN.,*

I.

AT last we may begin to breathe. It is true we have not got rid either of smoke or of fog, but we have begun to talk about them. We shall not get rid of them merely by talking about them, but if all intelligent people take an interest in the discussion, the whole subject may undergo a most searching investigation, and the result may, we hope, be, that when our minds are no longer in a fog on the subject of fogs, that speedy and successful action will follow knowledge and conviction. It is not my purpose in the course of two or three articles to dwell on the subject of fogs as distinct from smoke. I candidly state that I have not made a special study of fogs, but I have had, in my time, a good deal to do with smoke, and it appears to me that if we deal with smoke as successfully as I believe we may, we shall go a great way towards removing the pernicious effect of fogs, and may leave the remaining evils to be dealt with by those who make a special study of them.

It may clear the way if we consider first of all the schemes for dealing with smoke which appear to be impracticable or impotent. It is most disturbing to the mind to have a number of different schemes placed before it without having the necessary knowledge for discriminating their relative value. If, therefore, we begin by considering the schemes which appear to be impracticable or impotent, we shall be the better prepared to consider those schemes which may possibly lead to a successful issue.

Of the apparently impracticable schemes, one is to carry off smoke either by underground channels or by the existing sewers. The scheme is so startling, so novel, and so bewildering, that one might well wonder how upon earth it could be done. Experienced persons, however, would not wonder at all, simply because they know it would never be done. Let us consider for a few minutes what are the conditions. At present we have a chimney to every fireplace. When a fire is lighted the air, becoming warm, ascends the chimney, and if the air in the chimney is itself warm and of less pressure than the external air, and of the air in the room, there is what is called a chimney draught. Air passes up the chimney with rapidity, and carries off the smoke from the fire, the carbonic acid, carbonic oxide, and other products resulting from combustion. These products in such a case do not in any degree affect the purity of the air in the room. In using chimneys, therefore, as we now do we follow a tolerably sound system. We get rid of foul products over the roofs of our houses to serve their part in various ways in the economy of nature, and generally speaking we have no return of smoke. Suppose we abandon this system and carry off smoke to the sewers; how is this to be done? To understand how it might possibly be done, we must begin by understanding how smoke is carried off by a descending flue from a stove constructed for that purpose.

We will suppose the stove to stand in the middle of a room with no visible means of carrying off the smoke. A chimney of good draught is selected in one of the walls, and generally in a party wall, which has a fire-place below. This fire-place is either closed or used with such a stove or extremely contracted grate as allows very little air to ascend the chimney, and warm air only. From the interior of the stove

* Author of *Our Domestic Fire-places: A Treatise on Smoky Chimneys*, etc.

n the centre of the room above, or from the back of it, a descending flue of ample dimensions is carried through the floor; it then passes horizontally below the ceiling underneath to the chimney devoted to it, and as long as there is a good draught in the chimney, as long as the horizontal flue is not too long, is of ample size, kept free from soot, and as long as there is a fair pressure of air from the room in which the stove is placed, so long will air from the room flow to the chimney, overcome the difficulty of the descending flue, pass down it, pass along the horizontal flue, and carry with it all the products of combustion into the rarefied air of the chimney to escape above at a great elevation, as successfully as by an ordinary open fire-place.

The conditions of success are sufficient to indicate how there must certainly be a failure when the work is attempted by inexperienced persons. If we properly comprehend the difficulties of so simple a case, we shall be at no loss to understand the difficulties of carrying off the whole of our smoke by descending flues and underground channels. Instead of a single descending flue passing through the floor, we want descending flues, from every fireplace, carried right down below the basement of the house. Instead of the comparatively short horizontal flue, we require an enormous underground channel sufficient to carry off the products from all the fireplaces, and instead of the vertical chimney, we require an enormous chimney shaft to rise high above our roofs. As there could, by no possibility, be such a draught in the shaft as to carry off the products of our fires by a number of descending flues, and by a large underground channel, a powerful furnace would have to be kept burning beneath it, supplied with air only from the underground channel and from the house or houses. What the cost of maintaining the furnace would be, and to what extent the products would be successfully carried away, should be demonstrated by those who seriously propose such a system. For a single house the chimney shaft must be equal in area to the underground channel, and the underground channel must be equal in area to the flues, from the whole of the fireplaces in the house. If it be proposed to use one chimney shaft and one underground channel for a number of houses, the channel and shaft must be equal, in horizontal area, to the whole of the descending flues. The height of the shaft and the furnaces, moreover, must be in corresponding proportion. Now, suppose we take a house of ten rooms, that one half of the flues have a sectional area measuring nine inches by four and a half, and the other half a sectional area of fourteen inches by four and a half, this will give us an area of nearly four square feet, and if we take twenty houses we want an underground channel with an area of eighty square feet, and a chimney shaft of, at least, corresponding dimensions. What would be the inevitable result if we failed in obeying the necessary conditions? The fireplaces would either act with great uncertainty, or the whole of the products from certain fireplaces would refuse to pass away. Not only so, but the flues must be kept scrupulously clean, and the furnace in the shaft maintained without the slightest intermission. Many years ago, it was proposed to carry off the whole of the smoke of Manchester by a single chimney shaft, and gigantic underground channels. I endeavoured to make a computation as to what should be the size of the chimney shaft, and I came to the conclusion that it would have to be about the eighth of a mile in diameter, and about two miles in height. We may, therefore, probably consider this to be one of the impracticable schemes.

A second scheme, recently revived, has been to make underground channels of our sewers, but as these would have to be reconstructed of enormous dimensions, and as the chimney shaft would have to be proportionate, this scheme appears to be equally impracticable. It has been proposed by the same authority to send a shower of water down the descending flues for the purpose of carrying the smoke, etc., into the sewers. Whether this would get rid of the foul products in a satisfactory manner, we may be unprepared to state short of experience; but we may be quite sure of this, that the plan would not dispense with the necessity for powerful furnaces and enormous chimney shafts.

A third scheme is to carry our present chimneys into horizontal channels constructed over the roofs of our houses, and to connect these channels with immense chimney shafts. The furnace in each shaft would have to be on a level with our roofs, instead of near the ground, and firemen would have to mount to that height for the purpose of attending to them. By this system, also, the flues would have to be kept scrupulously clean and the furnace kept perpetually burning. I do not mention the names of the gentlemen who have brought forward these schemes, as it is reasonable to suppose they only did so tentatively for the purpose of eliciting discussion, but we shall probably have little difficulty in forming an opinion of their enormous cost and utter impracticability. In the next chapter we may proceed to consider some less unpromising means of dealing with smoke.

The Barton-on-Irwell (Manchester) Rural Sanitary Authority issue a set of simple regulations to persons carring out works of drainage in the district. They are compiled by their surveyor, Mr. Price, Assoc. M. Inst., C.E., under the Public Health Act, 1875.

APPOINTMENTS UNDER THE PUBLIC HEALTH ACT.—Walter John Sykes, M.D. Univ. Edin., has been appointed Medical Officer of Health for the Portsmouth Urban Sanitary District, at £450 per annum, and £50 per annum as Public Analyst, *vice* Turner, appointed Medical Officer of Health for the Barnet Rural Sanitary District, combined with several others; Francis Edward Atkinson, L.R.C.P. Lond., M.R.C.S. Eng., has been appointed Medical Officer of Health for the combined Skipton, Settle, and Keighley Rural, and Skipton, Silsden, Haworth, Oakworth, and Oxenhope Urban Sanitary Districts, *vice* Barry, appointed Sanitary Commissioner, Cyprus; William Galbraith, L.R.C.P. Edin., L.R.C.S. Edin., has been appointed Medical Officer of Health for the South Gosforth Urban Sanitary District, Northumberland; Mr. Arthur Johnson Hughes, Solicitor, has been appointed Town Clerk and Clerk to the Urban Sanitary Authority, Aberystwith, at £100 per annum, *vice* Thomas, deceased; R. S. Davison, M.R.C.S., has been appointed Medical Officer of Health for the Castle-ward Rural Sanitary District, Northumberland, at £80 per annum for three years; John Morgan, F.R.C.S., has been appointed Medical Officer of Health for the Langport Rural Sanitary District, Somersetshire, at £50 for one year; Mr. William Hodgson, has been appointed Surveyor, Collector, and Inspector of Nuisances, to the Keswick Local Board and Urban Sanitary Authority, at £90 per annum; Mr. Dennis Miller has been appointed Surveyor and Inspector of Nuisances to the Upton-on-Severn Rural Sanitary Authority, at £80 per annum.

THE

SANITARY RECORD.

JANUARY 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE HEIGHT OF ROOMS.

AMONGST other sanitary provisions in a local Act which the Corporation of Preston were successful in passing through Parliament last Session, is a section (No. 79), prescribing a minimum height of eight feet six inches for each dwelling or sleeping-room in every new dwelling. This provision is a more important one than may at first sight be supposed: for it is, perhaps, not generally known that, according to legal authorities, a Local Authority has no power, either by the Public Health Act or the bye-laws made under it, to require—as it is evidently of the utmost importance it should be able to require—that habitable rooms in new buildings shall be of a reasonable height. The legal difficulty has been appreciated by the Local Government Board, who in the circular letter of July 25th, 1877, which they sent out to Sanitary Authorities when the model bye-laws were issued, observed:—'Frequent applications have been made to the Board for confirmation of a bye-law prescribing a minimum height for habitable rooms, and it has been sought to justify such a provision as being a bye-law with respect to ventilation, and as being authorised by section 157 (3) of the Public Health Act, 1875. The important question as to whether the requirement of a minimum height for habitable rooms can be enforced by means of a bye-law with respect to ventilation, under the enactment above mentioned, suggests so many serious considerations, that the Board have decided to submit a case for the opinion of the law officers of the Crown upon the numerous points which have been raised in connection with the suggested bye-law.' This opinion of the law officers, if ever taken, has never been published: and meanwhile, many local authorities have had the clauses by which they proposed to require a certain minimum height for rooms unceremoniously struck out of their proposed bye-laws. The Preston Town Council have taken a bolder course, and have, as regards their district at least, lifted the question out of its present legal quagmire, by specifically taking power to require a minimum height of eight and a half feet for each living and sleeping room.

We must confess that we entirely fail to see the validity of the legal subtleties by which it has been sought to prove that the height of rooms cannot be regulated under section 157 of the Public Health Act. This section enables an Urban Authority to make bye-laws *inter alia* with respect to the ventilation of buildings. It is difficult to understand the grounds for the legal contention that 'ventilation' does not include the height of rooms, as the experience of architects, engineers, and sanitarians leads irresistibly to the conclusion that, as a matter of fact, the height of rooms *is* an element of the most important kind in real ventilation. If window-space be a proper subject to include in the model bye-laws, as concerned with the ventilation of rooms, the height of such rooms has at least equal claims for consideration. In the model bye-law requiring one-tenth of the floor area as a minimum for the window space of each room, the length and breadth of the room are alone considered. It is, however, not the floor, but a cubical space that has to be ventilated, and the merest tyro can understand how, if a room of unusual length or breadth were only six feet high, the fact that it had a window-space one-tenth of its floor area would not afford it ventilation in any real sense of the word.

It is curious that whilst the several subjects as to which bye-laws may be made are usually stated in the Public Health Act with considerable minuteness, nothing is laid down in section 157 as to the regulation of the interior of buildings, except as regards ventilation. This may have been done purposely by the Legislature, in view of the difficulty of laying down one standard of structure and dimensions for all classes of dwellings. But clearly, the ventilation of any room in such a way as to provide for the health and comfort of its occupants, must depend to a great degree upon its construction, and especially upon its height. If the room be high, the air need not be changed so rapidly as when it is low. The lower the room, the quicker the change of air must be, and the greater consequent difficulty of securing ventilation without a draught, which is always undesirable, and not unfrequently dangerous, especially in cold weather. People, especially poor people, who inhabit the houses for which building bye-laws are most required, are apt to think only of the length and breadth of the room in apportioning the number of its occupants: and thus, the enactment of a minimum height for rooms becomes necessary, if for no other reason, in order that overcrowding and consequent ill-health may not arise. The principle may indeed be laid down, that for the purposes of proper ventilation, a room must have a height in proportion to its length and breadth. It is therefore important that sanitary authorities should have power to regulate the height of rooms so as to secure the necessary cubic space for ventilation, and it would seem well not to make a lower standard than at least eight feet, in order that currents of air may pass over the heads of the occupants. The requirement of a minimum height of rooms was amongst the model bye-laws formerly issued by the Home Office before the Local Government Board was formed. It found a place in the Metropolitan Buildings Act of 1855, and has since been adopted by several provincial towns in their local Acts. It seems to have worked well, and without

complaint, in the places where it has been adopted, and if there be any valid legal objection to it under the present law, that law should certainly be amended without delay.

DISCONTINUANCE OF OUR TABLE OF MONTHLY MORTALITY STATISTICS.

It is with much regret that we have to announce our intention, arrived at after much hesitation and consideration, to discontinue the publication of our monthly table of Mortality Statistics.

The first of these tables was published eighteen months ago, and contained the statistics of but thirty-six Urban Sanitary Districts. The number of contributing districts has since steadily increased, and exceeded two hundred in each for the last three months of 1880. We have no reason to doubt that this number would have continued to increase until the contributors formed a majority of the more than 1600 Urban Sanitary Districts of England and Wales. The table, however, at present occupies five pages of our limited space, and it is patent that while it would have been impossible to publish these statistics for even 1000 of these districts, which would occupy twenty-five pages, it would have been equally impossible to make a satisfactory selection from among the sanitary districts which from time to time expressed their readiness to contribute to the table.

The increasing demands upon the available space in our columns, has forced upon us the conclusion that, with the certainty of the table before very long assuming unwieldy proportions, it is better to cease publishing the table with the close of the year 1880; and the table now published relates to the last month of that year.

Our opinion of the value of the uniform statistics of the smaller sanitary districts which we have from time to time been able to publish has not changed, and we do not doubt that, in some form or other, such statistics will eventually be required by a real Central Health Authority, as well as by the public. We have been forced to the conclusion, however, that in justice to our subscribers we can no longer devote so large a portion of our columns to the publication of these statistics, space which is urgently required for the treatment of the continually increasing range of subjects of public-health interest.

We cannot abandon our experiment, which perhaps has in a certain sense been only too successful, without tendering our best thanks to the more than two hundred Medical Officers of Health who have recently contributed to our Monthly Tables of Mortality Statistics. The punctuality with which their contributions have, in the main, been rendered, alone affords conclusive evidence of the interest which our contributors have felt in the success of our experiment.

There are, fortunately, grounds for satisfaction in the knowledge that from the commencement of this year improvements in the system of death-registration have been introduced, which will facilitate the publication of official returns for Sanitary Districts. Registrars are now instructed so to describe the place of death in the Death Registrar, that it shall be possible to distinguish the deaths registered in the various Urban and Rural Sanitary Districts. Further instructions have been issued for the purpose of securing the insertion in the Death Register of the previous residence of persons dying in public institutions. These improvements in death registration will not only afford considerable assistance to local Medical Officers of Health, but they render possible the publication by the Registrar-General of Returns for Sanitary Districts instead of, or in addition to, those for registration districts and sub-districts, which, for the purpose of local mortality statistics are comparatively useless. We can only hope that this now possible improvement in the Registrar-General's periodical Returns will not be very long delayed.

NOTES OF THE MONTH.

THE REDDITCH OFFICER OF HEALTH.

Our readers will not need to be reminded of the malfeasance of the Redditch Local Authority, nor of the persistent efforts which Mr. Herbert M. Page, their Medical Officer of Health, has made to induce them to take a right view of their duties and responsibilities. Since his appointment, now more than six years ago, Mr. Page has been constantly directing attention to the unwholesome state of the district, and urging improvement on the Local Authority. They turned a deaf ear to his complaints until the Local Government Board threatened them with a compulsory order under Section 299 of the Public Health Act; and since then they have been grudgingly and unwillingly taking steps towards carrying out a system of sewerage which the Whitehall Board has insisted on their providing. Meanwhile, certain members of the Local Authority, mostly owners of small property which has been condemned by Mr. Page, have lost no opportunities of discrediting him, and a majority of the Board have apparently been for some time making up their minds to a course of dealing with Mr. Page which is as mean as it is discreditable. The period for which Mr. Page's appointment had been sanctioned having come to an end, the Local Board, instead of re-appointing him, threw the office open, with the evident object of electing some one else; and this they have done, under the shallow and transparent pretence of desiring a change. The real motive of the change is, however, perfectly well understood by all concerned. For doing his work too well and too efficiently, Mr. Page has been summarily dismissed, his six years' hard sanitary work in the district not being given a moment's thought or the smallest consideration. The Local Board have thus easily rid themselves of a valuable and energetic officer, whose utterances were too true to be palatable. They have, moreover, by withdrawing their new officer from the purview of the Local Government Board, deprived the latter body of the information as to the sanitary state of the district which Mr. Page's very full periodical reports used to furnish. We shall be surprised, however, if the Central Authority, knowing what they do of the disgraceful condition of the district, allow the Local Authority to slumber peacefully in their filth. One inquiry, under Section 299 of the Public Health Act, has already been held in the district, with but meagre results, and unless some new leaf is soon turned over by the Authority—which seems most unlikely—further and more stringent action by the Local Government Board must inevitably follow.

THE TREATMENT OF FOOT AND MOUTH DISEASE.

The Duke of Brunswick has of late successfully combated the ravages of this much-dreaded enemy on his estate at Stampen, near Oels, in Prussian Silesia, by treatment with salicylic acid. Instead of

several weeks being required to effect a cure, as with the remedies hitherto employed, truly surprising results have been brought about within a few days by this new treatment. A solution of the acid is prepared by pouring some hot water on about three tablespoonfuls of salicylic acid in an earthen vessel, and adding lukewarm water to make up a gallon. The mouth and feet of the diseased animal should be carefully washed three times a day with this liquid, and the tops of the hoofs well powdered with the dry acid after each ablution. The effect will, moreover, be greatly increased by salicylating the drinking-water of the beasts by the addition of two tablespoonfuls of the acid dissolved in hot water. During the above treatment great attention must be paid to the perfect cleanliness of the stables or sheds. The dung must be saturated with salicylic acid solution, to prevent further infection, for it is chiefly in the dung that the germs of the disease are to be found. The above treatment has likewise given most satisfactory results in Alsace.

A NEW MILK TEST.

A new optical milk test has been invented by Herren Mittelstrap, of Magdeburg. A given quantity of milk, and also of water, is examined by looking through different thicknesses until opacity is reached. The vessel holding the liquid has a glass bottom, and in its cover a vertical graduated tube in a slide, with glass closing its lower end. Light is thrown up from below by means of an oblique mirror, or from a direct source. The tube (through which one looks) is moved in the slide until the light disappears, and at this point the scale is read off. Professor Maercker has made experiments with this apparatus, and states it to be very accurate, the greatest difference between the determination of fat in milk, with it, and by chemical analysis, being an average of 0.1 per cent. The usefulness of the instrument applies only to fresh milk, and for skim-milk a special tube is prepared.

SAFETY ARRANGEMENT FOR WATER-PIPES.

In order to obviate the very common evils connected with the bursting of water-pipes in winter, Herr Weissbarth has contrived an arrangement (we learn from the *Deutsche Industrie Zeitung*, and *Builders' Weekly Reporter*) by which any water that may escape thus is carried off into the street drain or a cesspool, and, at the same time, a cheap mode of heating the whole pipe system with a single gas or petroleum flame is rendered possible. The entire system of water-pipes, which, as in every right arrangement, must have, in all its branches, falls towards the ascending pipe, is (inclusive of the ascending pipe) inclosed in sheet-zinc pipes of 5 to 8 centimètres internal diameter; so that water finding exit at any part of the system gets into the inclosing pipe, and is carried away. The inclosing zinc pipes, about 1 metre long, are not soldered at the joints, but stuck into each other like gutter or waste pipes, and the water-pipes, of lead or iron, are fixed in the others by means of rings with small projecting pieces, bent at a right angle, which catch in metallic tholes, soldered on the interior of the zinc pipe. The lowest inclosing pipe has a bottom, through which the water-pipe passes tightly, and close above this is the tube by which the escaping water is carried off to the drain. In order to get at the water-pipe without having to take the zinc pipes out of each other, some of these are furnished with doors 70 to 75 centimètres long, and 5 to 6 centimètres wide, which are easily slid within the tube, as they are led above through a soldered metal ring, and below through packing; the latter, at the same time, prevents the water flowing out between the doors and the pipe; moreover, the longitudinal borders of the doors are packed interiorly, so that the water follows the packing, and does not issue by the door. The fixing of the zinc tubes to the walls is effected with rings on which they are supported with noses. Branch pipes are soldered into the main pipe. When, in a branch pipe, stop-cocks occur, the inclosing pipe is there perforated for the spindle and stuffing-box. In the longer branch pipes, as in the vertical ascending pipes, doors must also of course be introduced in the inclosing pipes, the openings being naturally on the upper side. At places where the ascending pipe is exposed to cold, as, *e.g.*, in water-closets or entrance halls, the arrangement permits readily of a warm air current being produced in the inclosing pipe, by means of a gas flame (which may also serve in illumination). To this end the pipe is furnished with an oblique branch directed upwards, and bent round to terminate in an iron or brass funnel, under which the gas or petroleum flame burns. The heat then passes into the inclosing tube. In the air-box above, holes are provided to let the air escape, and good ventilation may thus be secured. In order to facilitate repairs, the water-pipe, at the middle of the doors of the inclosing pipe, is formed with brass connecting screws. But the use of the ordinary soldered junction does not present any hindrance by reason of the zinc tube. Nor are any other serious difficulties, it is said, encountered in the working of the system.

THE HEALTH OF SYDNEY.

The Sydney Registrar-General has favoured us with a copy of his report on the vital statistics of that town during the month of May last. From this it appears, that the births numbered 334, and the deaths 160. Local diseases caused 43.13 per cent. of the total deaths, constitutional diseases 19.37 per cent., developmental diseases 13.75, and zymotic diseases 11.88 per cent. Five fatal cases of diarrhœa occurred, three of dysentery, and two of typhoid. Twelve persons died at the age of 70 and upwards. The death-rate is not given, but it appears to have been less than usual.

TYPHOID FEVER AND POLLUTED WATER.

In his last report on the Alcester Rural Sanitary District, Mr. G. H. Fosbroke gives the following interesting account of an outbreak of enteric fever, attacking fourteen persons in a block of eight cottages at Green Lane Shedley :—'A young woman aged 31 (married), died on November 29th of an undeveloped form of fever, and this was in due course reported. This was not however the first case that occurred, for about October 15th, a lad aged 15 had all the symptoms of modified typhoid fever, though no medical advice was sought. In the course of November, two children (a brother and sister of the lad) also suffered in a similar manner. During the first week in December, six other cases showed themselves, and four later in the month, all the eight families being invaded. A careful enquiry was at once made into the outbreaks, and, ultimately, Mr. Fosbroke came to the conclusion that all the evidence pointed to the water consumed, as the propagating channel of disease. The pump was connected with a well, sunk in a cultivated garden, at some con-

siderable distance from a pigsty and closet. On analysis, the water of this well was found to be decidedly polluted. Then came the question as to how the pollution had arisen, as it was of a temporary character, and in all probability, not derived from the distant closet or pigsty. Fortunately, while Mr. Fosbroke was examining the surroundings of the well, a child brought from one of the cottages a utensil containing excrement, and she threw it on the garden just over the well. Possessing this clue to the cause of the outbreak, and after hearing some very conflicting statements from the family who had been guilty of this neglect, Mr. Fosbroke established beyond doubt the fact that the excreta of the boy who had manifested symptoms of typhoid fever in October had also been thrown on to the garden just over the well. Here, then, after being baffled for some time, was clearly the cause of the outbreak.

WHOLE MEAL BREAD.

The inconvenience of founding a popular movement upon imperfectly accurate scientific detail has become apparent in reference to the Bread Reform League, who are appealing to the public to spread the knowledge of the advantages of wheat meal bread, in contradistinction to the ordinary white and brown breads. Mr. Wanklyn asserts that the statement that whole meal flour is more nutritious than ordinary bread, which is the basis of that movement, is erroneous. In a paper published in the *Philosophical Magazine*, May 1877, by himself, together with Mr. W. J. Cooper, he has shown that there is very little difference in the percentage of nitrogenous matter contained in different kinds of flour. The question of the phosphates is another question, and may, as we recently suggested, be settled in another way. If it is desirable to return the phosphates to the flour, this may be done, without grinding up the husks, by Professor Horsford's method of restoring the phosphates to the bread, described under the head of McDougall's Patent Flour, at page 129 of the SANITARY RECORD, Oct. 15, 1880.

THE PUBLIC HEALTH
DURING DECEMBER 1880.

THE mean temperature during December at the Royal Observatory, Greenwich, was 43°.2, which was no less than 4°.1 above the average December temperature in 100 years. The mean temperature of December in 1878 and 1879 did not exceed 33°.8 and 32°.4. An excess of temperature prevailed on nineteen of the thirty-one days of the month. The coldest day of the month was Christmas day, when the mean was 34°.0 and 5°.2 below the average; the warmest day was Tuesday, 28th, when the mean was 51°.3 (equal to an average day in the early part of May), and showed an excess of 12°.5. Rain was measured in Greenwich on fifteen of the thirty-one days of the month, to the aggregate amount of 3.0 inches, which exceeded the average December rainfall recorded at Greenwich during sixty-one years by an inch. During the last seven months of 1880 no less than 23.9 inches of rain were measured at Greenwich, which exceeded the average amount for the same period in sixty-one years by no less than 7.4 inches. The sun was above the horizon during 242.7 hours of December, but only 19.2 hours of bright sunshine were recorded; the average amount recorded in the three preceding corresponding months was 23.9 hours. South-westerly winds prevailed throughout the month.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, containing an estimated population of about seven-and-a-half millions of persons, or nearly a third of the entire population of England and Wales, 24,302 births and 14,713 deaths were registered during the five weeks ending 1st January. The births were equal to an annual rate of 33.8 per 1,000 of the estimated population in the twenty towns, against 34.2 and 35.2 in October and December. The birth-rate last month was 34.1 in London, and averaged 33.6 in the nineteen provincial towns; it ranged from 27.7 and 28.3 in Brighton and Bristol, to 37.0 and 37.4 in Salford and Wolverhampton.

The annual death-rate during the five weeks of December did not exceed 20.5 per 1,000, against 22.1 and 22.2 in the two preceding months. The average December death-rates in these twenty towns in the four years, 1876-7-8-9, were respectively 23.1, 24.5, 29.1, and 29.0. The general low rate of mortality during last month was undoubtedly due, in great measure, to the unseasonably mild temperature. It is worthy of note, however, that the mean temperature of December 1876 was equal to 44°.1, and still higher than that which prevailed last month, whereas the annual death-rate in December 1876 in the twenty towns was equal to 23.1 per 1,000, and exceeded by 2.6 per 1,000 the rate in December 1880.

The lowest annual rate of mortality in the twenty towns last month was 17.1 in Sheffield. The rates in the other towns, ranged in order from the lowest, were as follow:—Portsmouth, 17.3; Brighton, 17.6; Newcastle-upon-Tyne, 18.4; Wolverhampton, 18.8; Birmingham, 19.1; Bradford, 19.2; Bristol, 19.2; Leicester, 19°.4; Plymouth, 19.9; Leeds, 20.0; London, 20.3; Norwich, 20.8; Manchester, 21.7; Hull, 21.7; Oldham, 21.9; Salford, 22.8; Sunderland, 23.3; Liverpool, 24.1; and the highest rate during the month was 25.2 in the borough of Nottingham. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during December averaged 20.7 per 1,000, while in London it was equal to 20.3. The high death-rates during last month in Liverpool and Nottingham were not due to excessive zymotic fatality; in Nottingham the rate of infant mortality was exceptionally high.

The 14,713 deaths from all causes in the twenty towns last month included 1,843 which were referred to the seven principal zymotic diseases; of these, 646 resulted from scarlet fever, 354 from whooping-cough, 344 from measles, 192 from fever, principally enteric, 132 from diarrhœa, 89 from small-pox, and 86 from diphtheria. These 1,843 deaths were equal to an annual rate of 2.6 per 1,000 in the twenty towns during the five weeks under notice, against rates declining steadily from 7.8 to 2.9 in the four preceding months. The zymotic death-rate last month was equal to 2.7 per 1,000 in London, and averaged 2.4 in the nineteen provincial towns. The lowest annual death-rates from these seven diseases during December were 1.3 both in Brighton and Plymouth, and 1.5 in Birmingham and Newcastle-upou-Tyne, while the rates ranged upwards in the other towns to 3.2 in Hull, 4.5 in Salford, and 5.2 in Sunderland. The high zymotic death-rate in Sunderland was due to the continuance of the fatal epidemic of scarlet fever.

Scarlet-fever, although the most fatal zymotic

disease during last month, was not so fatal as it had been in October and November. The annual death-rate from this disease was equal to 0.90 per 1,000, against 1.04 and 1.07 in October and November. The largest proportional fatality occurred in Oldham, Norwich, and Sunderland; in the last of these towns the scarlet-fever death-rate was equal to 3.7 per 1,000, and corresponded with the rate in the preceding month. The fatality of whooping-cough showed a general increase upon that which had prevailed in recent months, and was largest in Hull. The 192 deaths from fever (including typhus, enteric, and simple continued) in the twenty towns were equal to an annual rate of 0.27 per 1,000, and showed a marked decline from the rates that prevailed in the three preceding months. In London, the death-rate from fever last month did not exceed 0.18, whereas it averaged 0.35 in the nineteen provincial towns. Fever was, therefore, nearly twice as fatal during December, in the provincial towns, as in London. The death-rate from measles, which had been 0.15, 0.30, and 0.41, in September, October, and November, further rose to 0.48 in December; the greatest fatality occurred in Salford and London. The 86 deaths referred to diphtheria in the twenty towns included no less than 56 in London, while only 30 occurred in the nineteen other towns; of the latter, 6 were returned in Birmingham, 4 in Liverpool, 4 in Salford, and 4 in Portsmouth. Small-pox caused 87 more deaths in London, one in Liverpool, and one in Manchester; whereas no fatal case of this disease occurred in any of the seventeen other provincial towns. The prevalence of small-pox in London showed a further marked increase during December, and the number of small-pox patients in the Metropolitan small-pox hospitals, which had been successively 95, 105, and 210 at the end of September, October, and November further rose to 440 at the end of December. The average weekly number of new cases of small-pox admitted to these hospitals, which had been respectively 15, 20, and 53 in the three preceding months, were 97 during December. This serious increase of small-pox prevalence was largest in the east and south groups of registration districts.

The fatality of diseases of the respiratory organs, under the influence of unseasonably mild weather, showed a decline from that which prevailed in November. The average weekly number of deaths referred to these diseases in London, which had been 160, 299, and 369 in the three preceding months, declined again to 316 in the five weeks of December; this number was no less than 214 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases, during December, was equal to 4.5 per 1,000 in London, against 5.3 in November. The death-rate from lung diseases last month, in those of the nineteen provincial towns for which the information is available, ranged from 2.4 and 4.1 in Newcastle-upon-Tyne and Wolverhampton, to 6.0 and 8.0 in Salford and Oldham.

In the outer ring of suburban districts around London, having a population of a little less than a million persons, the annual death-rate during December from all causes did not exceed 15.5 per 1,000, against 15.5 and 16.8 in the two preceding months; and the zymotic death-rate was equal to 1.6 per 1,000, against 2.1 and 1.6 in October and November. The rates from all causes, and from the seven principal zymotic diseases in inner or registration London, were, as before stated, 20.3 and 2.7 respectively during last month.

The accompanying table contains uniform December mortality statistics for 212 urban sanitary districts, furnished by the local Medical Officers of Health. The number of contributing sanitary districts in the two preceding months were 214 and 210. On the last day of December 217 postcards were sent out to the Medical Officers of Health of as many urban sanitary districts. We have been able to include in the accompanying table the mortality statistics relating to 212 of the sanitary districts. The estimated population of the 212 districts, for which we publish December statistics, is about 7½ millions, and including London with its outer ring of suburban districts, the aggregate population dealt with is little short of 12 millions, and nearly half the entire population of England and Wales. The birth-rate in those districts furnishing this information averaged 33.2 per 1,000, against 32.5 and 34.4 in the two preceding months. Exceptionably low birth-rates (under twenty-one per 1,000) prevailed in Belgrave, Ebbw Vale, Liversedge, Nelson, Penzance, and Reigate. Rates, on the other hand, exceeding forty-five per 1,000 were recorded in Bradford (Lancashire), Chiswick, Ilkeston, Morley, Rowley-Regis, and Workington. The numbers upon which some of these rates are calculated are somewhat small, but the high rates suggest an underestimate of the present population of the sanitary districts. These doubts will be set at rest by the approaching census, and thus increased value will be given to local vital statistics.

The annual death-rate in the aggregate of the 212 sanitary districts averaged 19.9 per 1,000 of the estimated population, against 18.0 and 21.4 in the two preceding months. In twenty of the largest English towns, including London, the rate last month was, as before stated, 20.5 per 1,000; the death-rate in the smaller towns was, therefore, somewhat lower than that which prevailed in the large towns. Very low birth-rates (under 11 per 1,000) prevailed during December in the following sanitary districts: Aston Manor, Beckenham, Goole, Rowley-Regis, Rusholme, Sittingbourne, Teignmouth, Torquay, and Weston-super-Mare. Rates, on the other hand, exceeding 30 per 1,000 were recorded in Ashton-under-Lyne, Crompton, Neath, Pontypool, Mexborough, Tamworth, Tredegar, and Walker-on-Tyne. Excepting those in Neath and Pontypool, these excessive death-rates do not appear to have been due to excessive zymotic fatality. The annual death-rate from the seven principal zymotic diseases in the 212 sanitary districts averaged 2.2 per 1,000, against 8.7, 3.9, and 2.8 in the three preceding months. The fatality from these zymotic diseases was generally below the average. In fifty-six of the 212 sanitary districts, no death was referred during December to any of these principal zymotic diseases; while an excessive zymotic death-rate (above five per 1,000) prevailed in Aspull, Batley, Bottle-cum-Linacre, Burslem, East Ham, Neath, Padiham, Trowbridge, and Willenhall.

The general fatality of scarlet fever showed a slight decline from that which prevailed in the previous month; the largest proportional excess occurred in Bootle-cum-Linacre, Devonport, Neath, Swansea, and Willenhall. Measles fatality showed a further increase during December, and was severely epidemic in Burslem and Merthyr Tydfil. The death-rate from whooping-cough differed but slightly from that which prevailed in the two preceding months; the mortality of the disease was, however, proportionally excessive in Bolton, Batley, Burslem,

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence			Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	3,866,149	11961	7111	1570	1813	*	*	*	1550	944	87	263	304	56	106	68	65	1580	668	288	1362	34.1	20.8	2.7	2.2	
ABERSYCHAN	14,000	27	18	6	2	..	2	6	2	..	..	..	..	..	..	..	..	1	4	3	..	22.7	15.1	0.0	0.8	J. W. Mulligan, M.D.
ABINGDON	6,033	13	8	3	1	..	..	2	2	..	..	..	..	..	..	..	..	..	1	..	..	25.4	15.6	0.0	0.0	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	76	45	14	5	2	3	15	6	2	..	..	..	1	..	1	..	13	4	..	..	29.8	17.7	0.8	5.1	T. Milne, M.A., M.D.
ACTON‡	16,000	67	26	8	5	..	1	7	5	1	..	..	..	..	1	..	..	10	2	1	..	43.7	16.9	0.7	6.5	T. Francis.
ALTRINCHAM	12,000	37	14	3	4	..	..	2	5	2	..	..	2	..	..	..	..	2	1	..	..	36.3	13.7	2.0	2.0	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	99	88	22	17	2	2	21	24	10	..	..	2	1	..	2	5	24	5	..	12	34.9	31.0	3.5	8.5	W. H. Hughes.
ASPULL	8,000	23	13	2	7	..	..	1	3	5	..	..	3	..	..	1	1	1	1	..	..	33.9	19.1	7.4	1.5	H. Smith.
ASTLEY BRIDGE	5,750	27	8	3	1	..	..	1	3	1	..	..	..	..	1	..	..	2	1	..	..	55.3	16.4	2.0	4.1	R. Settle, M.D.
ASTON MANOR	52,821	173	49	12	8	5	3	12	9	4	..	..	..	3	1	..	..	6	5	1	..	38.6	10.9	0.9	1.3	H. May.
AUDENSHAW	6,000	9	10	2	..	..	2	3	3	..	..	..	..	..	..	..	..	2	3	..	..	17.6	19.6	0.0	3.9	R. Slater.
BAILDON‡	5,000	*	10	4	..	..	..	4	2	..	..	..	..	..	..	..	..	5	1	..	..	*	20.9	0.0	10.4	H. Walker.
BANBURY‡	13,500	*	17	2	3	1	2	3	6	4	..	..	3	..	1	..	..	4	2	..	..	*	13.1	3.1	3.1	R. Grimbly.
BANGOR	7,835	24	13	..	..	1	3	5	4	..	..	..	..	..	..	..	..	1	3	1	..	36.1	19.5	0.0	1.5	H. Rees.
BARNSLEY	30,000	92	37	6	6	4	2	11	8	..	..	..	..	..	..	..	..	8	7	..	5	36.1	14.5	0.0	3.1	M. T. Sadler, B.A., M.D.
BARROW-IN-FURNESS	40,000	135	55	9	16	4	7	16	3	8	..	..	2	1	2	2	1	16	3	2	3	39.7	16.2	2.4	4.7	J. Settle.
BATH†	53,649	89	73	15	6	1	1	20	30	3	..	..	..	..	1	2	..	17	7	5	19	21.6	17.7	0.7	4.1	A. B. Brabazon, M.D.
BATLEY	29,851	59	55	17	16	3	5	8	6	14	..	1	4	..	6	2	1	11	3	1	..	23.3	21.7	5.5	4.3	W. Bayldon.
BECCLES	5,000	18	7	3	1	..	..	1	2	..	..	..	..	..	..	..	..	1	..	1	1	42.4	16.5	0.0	2.4	E. B. Crowfoot, M.B.
BECKENHAM†	12,200	37	8	3	1	..	..	2	2	..	..	..	..	..	..	..	..	1	..	..	..	39.5	8.5	0.0	1.1	C. O. Baylis, M.D.
BELGRAVE	8,000	11	8	1	1	1	..	3	2	1	..	..	..	..	..	..	..	3	1	1	..	16.2	11.8	1.5	4.4	A. W. Emms.
BETHESDA	6,610	7	9	1	..	1	3	1	3	1	..	..	..	1	..	..	..	3	1	..	..	12.5	16.0	1.8	5.3	H. Rees.
BILSTON	25,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	S. G. Gilbert.
BINGLEY	9,000	16	4	..	1	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	20.9	5.2	1.3	0.0	J. W. Craig, M.D.
BIRMINGHAM‡	394,738	1320	710	182	115	34	28	200	157	57	..	3	9	6	26	5	8	144	78	39	129	34.8	18.9	1.5	3.8	A. Hill, M.D.
BISLEY	5,264	5	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	11.2	4.5	0.0	0.0	T. Partridge.
BLACKROD	4,000	5	6	2	3	1	..	..	..	2	..	..	1	..	..	..	1	..	..	..	..	14.7	17.6	5.9	0.0	H. Smith.
BLYTH	2,000	6	5	..	..	..	..	..	5	..	..	..	..	..	..	..	..	2	..	..	..	35.3	29.4	0.0	11.8	H. D. Ward, M.D.
BOLTON†	106,500	280	147	33	26	7	11	40	30	26	..	2	3	..	16	2	3	30	10	4	..	34.3	18.0	3.2	3.7	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	50	16	11	3	3	11	6	12	..	..	[illegible]	..	3	1	..	10	3	4	2	*	22.2	5.3	4.4	R. J. Sprakeling.
BOSTON†	15,000	38	31	13	2	1	2	7	6	1	..	..	..	..	..	1	..	8	2	..	10	33.0	26.9	0.9	7.0	W. Clegg.
BRADFORD (LANC.)‡	15,000	67	20	5	5	2	..	6	2	2	..	..	..	..	2	..	..	5	1	..	..	46.6	13.9	1.4	3.5	J. Hudson.
BRADFORD (YORKS.)‡	197,196	576	362	88	75	17	19	108	55	46	..	1	22	2	15	4	2	79	37	4	31	30.5	19.1	2.4	4.2	H. Butterfield.
BRAINTREE	5,000	*	7	1	1	1	1	2	1	..	..	..	..	..	..	..	..	..	1	1	..	*	16.5	0.0	0.0	J. Harrison.
BRENTFORD	11,557	25	17	4	3	..	1	6	3	..	..	..	..	..	..	..	..	3	3	..	..	25.5	17.5	0.0	3.1	J. Williams, S.Sc.C.Camb.
BRIDGNORTH	6,000	13	6	1	1	..	1	1	2	1	..	..	..	..	..	..	1	2	1	..	..	25.5	11.8	2.0	3.9	A. Mathias.
BRIDGWATER	13,000	39	20	3	2	1	2	6	6	3	..	..	2	..	..	1	..	..	1	..	4	35.3	18.1	2.7	0.0	F. J. C. Parsons.
BRIDPORT	8,145	13	17	6	1	..	..	1	9	..	..	..	..	..	..	..	..	5	1	2	1	18.8	24.6	0.0	7.2	G. M. Evans.
BRIGHTON†	107,321	285	181	40	*	*	*	*	57	13	..	9	2	..	2	2	..	*	*	11	34	27.7	17.6	1.3	*	
BRISTOL‡	213,536	578	398	82	*	*	*	*	104	31	..	1	37	1	4	3	5	*	*	9	60	28.3	19.2	2.5	*	
BROMLEY (KENT)	14,293	*	13	4	1	2	..	4	2	3	..	..	2	..	..	..	1	..	1	..	..	*	11.1	2.6	0.0	C. O. Baylis, M.D.
BROMSGROVE	6,967	20	10	5	1	..	..	3	1	1	..	..	2	..	..	..	1	2	..	..	..	33.8	16.9	1.7	3.4	C. Carey.
BROWNHILLS	11,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. E. Flinn.
BURNLEY‡	56,000	*	114	34	23	2	6	36	13	9	..	..	6	..	1	2	..	27	14	2	..	*	21.2	1.7	5.0	T. Dean, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Burslem	29,159	87	70	19	25	5	1	9	11	27	..	17	..	..	9	..	1	9	1	1	..	35.1	28.3	10.9	3.6	J. M. Taylor.
Burton-upon-Trent	33,000	119	59	18	11	5	4	9	12	9	1	4	3	..	1	..	..	15	6	1		41.8	20.7	3.2	5.3	C. Perks.
Bury†	50,000	94	73	14	8	1	..	6	15	13	6	..	2	1	2	1	1	12	7	6		24.5	19.0	3.3	3.1	H. Ashworth.
Bury St. Edmunds	15,600	32	38	12	4	1	..	6	15	3	..	..	..	..	3	..	..	6	2	..	7	24.2	28.7	2.3	4.5	F. W. Clarke.
Camborne	15,000	*	31	13	1	1	4	7	5	6	..	1	..	..	..	5	..	3	4	..	..	*	24.3	4.7	2.4	E. S. Angove.
Cambridge	34,500	83	42	11	6	3	4	10	8	4	..	2	1	..	..	..	1	7	5	1	..	28.3	14.3	1.4	2.4	B. Anningson, M.D.
Canterbury	20,962	59	29	4	2	..	1	8	14	..	..	..	..	..	..	..	..	9	5	..	5	33.1	16.3	0.0	5.1	F. Wacher.
Cardiff	82,364	214	125	24	33	8	4	38	18	26	..	9	6	1	6	1	3	22	10	8	18	30.6	17.9	3.7	4.0	H. J. Paine, M.D.
Carlisle†	35,000	86	52	11	4	4	0	11	12	3	..	..	1	..	1	1	..	8	6	..	7	32.0	19.4	1.1	3.0	R. Elliot, M.D.
Carnarvon	10,407	22	23	3	3	1	..	8	8	1	..	..	..	..	..	..	1	3	..	1	..	24.9	26.0	1.1	7.4	H. Rees.
Chatteris	4,769	10	3	..	..	..	..	1	2	..	..	..	..	..	..	..	..	2	..	..	..	24.7	7.4	0.0	4.9	M. O'Conner.
Chelmsford	9,700	31	23	3	1	..	2	6	11	..	..	..	..	..	..	..	..	5	5	1	1	37.6	27.9	0.0	6.1	E. H. Carter.
Cheltenham‡	45,000	96	88	30	9	3	2	18	26	2	..	..	..	..	1	..	1	16	7	2	11	22.2	20.4	0.5	3.7	T. Wright, M.D.
Chiswick	15,000	54	30	16	4	..	1	1	8	4	..	4	..	..	..	..	..	11	1	..	..	43.3	24.0	3.3	8.1	F. C. Dodsworth.
Cirencester	7,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F. T. Bond, M.D.
Cleckheaton	9,250	33	14	2	5	2	1	1	3	2	..	..	..	..	1	1	..	3	1	..	..	42.0	17.8	2.5	3.8	H. O. Steele.
Cockermouth	5,550	*	8	3	2	..	..	..	3	3	..	1	2	..	..	..	..	1	..	..	..	*	17.0	6.4	2.1	J. Ward, M.D.
Colchester	28,924	73	35	3	4	5	1	13	9	3	..	..	2	..	..	1	..	6	5	1	6	29.7	14.2	1.2	2.4	E. Waylen.
Congleton‡	12,000	16	17	1	1	1	1	3	10	1	..	..	..	..	..	1	..	2	3	..	..	13.9	14.8	0.9	1.7	P. M. Davidson.
Consett	7,868	19	16	8	1	3	..	1	1	3	..	..	3	..	..	..	..	4	..	..	..	28.4	24.0	4.5	6.0	W. M. Renton, M.D.
Coseley	23,000	53	35	11	8	..	1	6	9	3	..	..	..	..	1	1	1	6	..	..	..	27.1	17.9	1.5	3.1	J. Eagleton.
Coventry‡	41,000	129	76	13	16	13	7	10	17	9	..	1	8	..	..	..	..	12	5	6	3	32.8	19.3	2.3	3.1	M. A. Fenton, M.D.
Cowpen	5,000	22	7	2	2	..	..	3	..	..	..	..	..	..	..	..	..	2	1	..	..	51.8	16.5	0.0	4.7	H. D. Ward, M.D.
Crewe	26,737	67	27	6	6	4	..	4	7	7	..	..	6	..	..	1	..	3	1	..	..	29.5	11.9	3.1	1.3	T. C. Bailey.
Crompton‡	10,000	38	29	10	7	..	1	6	5	3	..	..	2	..	1	..	..	3	..	..	..	39.6	30.2	3.1	8.3	W. Brooke, M.D.
Croydon	71,000	212	109	32	9	5	7	30	26	7	..	..	2	2	..	2	1	22	11	4	15	35.2	18.1	1.2	3.6	C. W. Philpot, M.D., B.Sc.
Dawlish	3,838	*	4	..	2	..	..	..	2	1	..	1	..	..	..	..	..	..	..	..	..	*	12.3	3.1	0.0	L. Armstrong.
Derby‡	80,385	284	145	45	27	6	3	27	37	18	..	6	3	..	3	4	2	21	8	5	16	36.8	18.8	2.3	2.7	W. Iliffe.
Dereham, East	5,790	12	4	..	1	1	..	1	1	1	..	..	1	..	..	..	..	..	1	..	..	24.4	8.1	2.0	0.0	H. B. Vincent.
Devonport‡	50,000	124	101	16	16	9	11	23	26	14	..	..	11	2	1	..	..	16	14	..	7	25.9	21.1	2.9	3.3	J. May, jun.
Dorchester	7,500	25	10	2	1	..	1	4	2	..	..	..	..	..	..	..	..	4	2	..	..	39.2	15.7	0.0	6.3	E. J. Day.
Dover	33,636	67	40	7	2	3	..	13	15	..	..	..	..	..	..	..	..	4	1	3	7	23.5	14.0	0.0	2.1	M. K. Robinson, M.D.
Droitwich	3,600	11	8	2	..	..	..	3	3	..	..	..	..	..	..	..	..	..	1	..	3	35.9	26.1	0.0	0.0	H. Swete, M.D., S.Sc.C. Camb.
Droylsden	8,000	21	12	2	2	1	1	3	3	1	..	..	1	..	..	..	..	2	3	1	..	30.9	17.7	1.5	2.9	R. Slater.
Ealing	12,500	36	17	5	..	1	..	8	3	..	..	..	..	..	..	..	..	5	1	..	..	33.9	16.0	0.0	4.7	C. A. Patten.
Eastbourne	18,000	*	30	11	5	1	2	4	7	1	..	..	..	..	..	1	..	2	1	2	3	*	19.6	0.7	1.3	E. F. Fussell, M.B.
East Ham	9,937	29	14	5	5	2	1	..	1	5	..	1	3	1	..	..	..	5	1	..	..	34.4	16.6	5.9	5.9	H. H. Mason, S.Sc.C.Camb.
Ebbw Vale‡	17,000	34	24	6	4	1	3	7	3	2	..	1	..	..	1	..	..	7	6	..	..	20.9	14.7	1.2	4.3	J. W. Davies, M.D.
Epsom†	7,550	4	8	1	1	1	..	2	3	..	..	..	..	..	..	..	..	1	2	..	1	*	13.8	0.0	1.7	E. L. Jacob.
Eton‡	2,806	6	2	1	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	22.3	7.4	0.0	3.7	A. J. Southey.
Evesham	4,888	*	5	2	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	*	12.0	0.0	0.0	G.H.Fosbroke,jun., S.Sc.C.Cam.
Failsworth‡	8,000	*	8	3	..	2	2	..	1	..	..	..	..	..	..	..	..	5	..	..	..	*	10.4	0.0	6.5	G. W. Beattie, M.D.
Farnham	5,000	13	12	2	..	..	..	2	8	..	..	..	..	..	..	..	..	6	..	..	5	30.6	28.2	0.0	14.1	S. G. Sloman, jun.
Fenton	14,000	47	23	10	3	4	..	5	1	1	..	..	1	..	..	..	..	..	3	..	..	39.5	19.3	0.8	0.0	A. V. Griffiths.
Finchley‡	11,339	28	9	3	3	..	..	2	1	2	..	1	..	1	..	..	..	4	..	..	..	25.8	8.3	1.8	3.7	J. Turle, M.D.

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† The statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged: 0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Deaths from: Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence	Deaths in Public Institutions	Annual rate per 1000 persons living: Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	Medical Officers of Health.
Fleetwood	5,000	30	11	5	1	1	..	2	2	2	..	..	1	1	..	..	..	2	..	..	..	70.6	25.9	4.7	4.7	J. Porter.
Garston†	8,500	23	9	5	..	..	2	2	..	..	..	..	..	..	..	..	..	1	2	..	..	35.3	13.9	0.0	1.5	J. A. Fisher.
Glossop	18,697	52	34	6	4	3	2	6	13	..	..	..	..	..	..	..	..	8	2	1	..	32.7	21.4	0.0	5.0	J. Rhodes.
Gloucester	37,907	99	54	6	6	3	2	15	22	6	..	..	..	2	1	2	1	10	3	2	6	30.8	16.8	1.9	3.1	J. P. Wilton.
Goole	10,205	27	5	2	1	..	..	1	1	1	..	..	..	..	..	..	1	1	1	..	2	31.1	5.8	1.2	1.2	J. Mitchell Wilson, M.B., S.Sc.C.
Gorton‡	32,000	117	61	23	7	4	6	14	17	6	..	1	..	..	..	3	2	18	4	..	..	38.1	19.9	2.0	5.9	R. E. Hammond.
Great Driffield	6,033	18	4	1	..	..	..	3	..	1	..	..	..	..	..	..	1	1	..	..	..	35.2	7.8	2.0	2.0	D. Ridpath, M.D.
Guildford	10,167	32	20	6	2	..	2	4	4	..	..	..	..	..	..	..	..	6	..	..	..	37.1	23.2	0.0	7.0	J. Morton, M.B.
Halifax†	72,000	176	105	20	20	*	*	*	18	11	..	1	5	..	4	..	1	13	14	3	7	31.6	18.9	2.0	2.3	D. Ainley.
Handsworth (Stafford)	22,630	69	28	8	5	..	2	7	6	2	..	..	2	..	..	..	..	5	1	..	..	35.9	14.6	1.0	2.6	J. B. Welch, M.B.
Harborne	6,000	24	9	4	1	..	1	2	1	1	..	..	..	..	..	1	..	1	..	..	1	47.1	17.6	2.0	2.0	R. W. Smith, M.D.
Harwich	7,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. K. Morgan.
Haslingden‡	14,000	56	24	5	4	..	1	10	4	4	..	1	1	..	..	1	1	2	3	..	..	41.7	17.9	3.0	1.5	J. A. Harrison, M.D.
Hastings‡	39,780	86	70	19	5	2	4	27	13	..	..	..	..	..	..	..	..	15	10	3	5	22.5	18.3	0.0	2.9	C. Ashenden.
Hendon‡	9,297	24	14	4	1	..	..	4	2	..	..	..	..	..	..	..	..	5	1	..	3	26.9	15.7	0.0	5.6	J. Cameron, M.D.
Heywood	25,000	*	61	13	6	3	5	17	17	8	1	..	2	3	1	..	1	12	4	3	..	*	28.7	3.8	5.7	H. Wisken.
Hinckley	7,500	22	15	4	3	..	1	5	2	3	..	2	..	..	..	1	..	4	1	1	..	34.5	23.5	4.7	2.3	W. H. Griffiths.
Hindley	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Horwich	4,315	7	6	2	..	..	..	2	2	..	..	..	..	..	..	..	..	..	1	..	..	19.1	16.4	0.0	0.0	G. H. Whitaker.
Huddersfield‡	81,780	242	152	30	22	6	*	43	36	13	..	1	..	1	1	9	1	30	18	5	17	30.9	19.4	1.7	3.8	J. S. Cameron, M.D., B.Sc.
Hull‡	149,627	509	311	79	*	*	*	*	77	46	..	..	9	1	27	5	4	*	*	13	29	35.5	21.7	3.2	*	
Hurst	7,000	18	8	..	..	1	1	1	5	1	..	..	1	..	..	..	..	1	1	..	..	30.3	13.4	1.7	1.7	T. Cooke.
Hyde	28,218	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
Ilfracombe	5,500	14	9	2	2	..	1	..	4	3	..	3	..	..	..	..	..	..	..	..	..	30.0	19.3	6.4	0.0	E. J. Slade-King, M.D., S.Sc.C.
Ilkeston	12,356	68	24	5	4	2	1	3	9	5	..	..	2	..	..	3	..	5	2	3	..	64.8	22.9	4.8	4.8	R. Wood.
Ipswich	48,001	97	67	19	10	2	5	18	13	7	..	..	..	1	2	3	1	13	9	7	2	23.8	16.4	1.7	3.2	G. S. Elliston.
Keighley	24,000	61	51	10	12	3	3	16	7	2	..	..	2	..	..	..	..	13	6	1	3	29.9	25.0	1.0	6.4	A. Roberts.
Leamington	24,500	56	32	3	1	1	2	11	14	..	..	..	..	..	..	..	..	2	5	4	4	26.9	15.4	0.0	1.0	J. S. Baly.
Leeds‡	318,927	1056	611	165	125	*	*	*	115	77	..	2	16	2	33	16	8	129	39	41	*	34.6	20.0	2.5	4.8	G. Goldie.
Leek	12,527	38	18	4	1	..	2	4	7	..	..	..	..	..	..	..	..	2	1	1	4	35.7	16.9	0.0	1.9	J. J. Ritchie.
Leicester‡	129,912	408	242	63	*	*	*	*	49	26	..	3	13	1	1	7	1	*	*	6	34	32.8	19.4	2.1	*	
Leigh	20,600	69	42	12	14	2	..	9	5	7	..	5	1	..	..	1	..	7	4	..	..	39.4	24.0	4.0	4.0	J. Hall.
Lichfield	8,129	20	13	1	..	2	1	4	5	1	..	..	..	..	..	..	..	2	2	..	..	45.9	29.8	2.3	4.6	G. A. Carter, M.D.
Lincoln‡	32,103	114	68	19	6	3	3	17	20	3	..	..	..	..	2	..	1	14	10	2	12	37.0	22.1	1.0	4.5	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,000	11	2	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	32.4	5.9	0.0	0.0	C. Kelly, M.D.
Liverpool‡	544,056	1861	1257	255	244	78	63	414	203	153	1	9	59	4	46	28	6	307	111	77	202	35.7	24.1	2.9	5.9	J. S. Taylor, M.D.
Liversedge	13,750	21	17	3	5	1	1	4	3	3	..	..	..	..	..	1	2	3	..	..	..	18.0	14.6	2.6	2.6	W. J. Sykes, M.D.
Louth	10,750	23	13	3	1	..	..	3	6	1	..	..	..	..	..	1	..	4	..	..	1	25.2	14.2	1.1	4.4	R. Domenichetti, M.D.
Luton	24,200	60	46	12	10	3	2	11	8	7	..	..	1	6	..	..	..	8	8	2	3	29.2	22.4	3.4	3.9	H. Sworder.
Lytham‡	5,000	12	4	2	..	..	..	..	2	1	..	..	..	..	1	..	..	..	..	..	..	25.1	8.4	2.1	0.0	W. E. Pountney, M.B.
Macclesfield	36,641	100	71	10	5	3	8	21	24	3	..	1	..	..	1	..	1	12	9	2	12	32.1	22.8	1.8	3.9	G. Bland.
Maidenhead	8,281	21	9	2	1	1	..	2	3	..	..	..	..	..	..	..	..	..	..	..	2	29.9	12.8	0.0	0.0	W. T. G. Woodforde, M.D.
Maidstone‡	29,537	77	45	9	4	2	3	11	16	1	..	..	..	..	..	..	..	4	2	..	..	27.2	15.9	0.4	2.5	M. A. Adams.
Manchester‡	363,130	1109	756	137	84	24	24	*	140	75	1	7	39	1	16	5	6	7	4	2	..	31.9	21.7	2.2	*	
Merthyr Tydfil	52,000	132	125	25	27	8	8	22	35	16	..	11	1	1	..	2	1	37	13	5	8	27.3	25.8	3.3	7.6	T. J. Dyke.

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MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Mexborough	6,000	28	16	7	3	3	..	..	3	2	..	..	2	..	..	..	..	7	..	..	..	54.9	31.4	3.9	13.7	W. Sykes.
Middlesbrough	58,988	170	93	33	23	1	3	17	16	11	..	3	1	..	4	3	..	18	4	3	13	33.9	18.6	2.2	3.6	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. B. Knott.
Mirfield	12,725	23	28	6	2	1	4	7	8	2	..	..	1	..	..	1	..	6	4	3	..	21.3	25.9	1.9	5.6	W. Marsden.
Morley	12,100	48	18	6	..	..	9	3	..	..	..	..	..	..	..	..	..	1	1	..	..	46.7	17.5	0.c	1.0	S. T. Steele, S.Sc.C.Camb.
Moss-Side	16,500	42	25	4	4	3	1	5	8	2	..	..	1	..	..	1	..	4	3	..	..	37.1	17.8	1.4	2.9	A. E. Sutcliffe.
Neath	12,000	*	36	7	21	1	1	2	4	14	..	2	10	..	2	..	..	8	6	..	2	*	35.3	13.7	7.9	G. Ryding, M.D.
Nelson	12,000	21	12	1	2	2	1	..	6	3	..	..	2	..	..	1	..	5	..	..	..	20.6	11.8	2.9	4.9	T. Dean, M.D.
Newark‡	13,746	51	23	6	4	1	..	6	7	3	..	..	2	..	1	..	..	7	3	1	..	38.7	17.5	2.3	5.3	A. Ashby, M.B.
Newbury	9,796	23	21	1	4	..	1	6	9	2	..	..	1	..	..	..	1	2	..	1	6	27.6	25.2	2.4	2.4	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	42	32	19	7	3	..	8	4	3	..	2	..	1	..	..	..	8	..	1	..	27.5	20.9	2.0	5.2	St. J. Edwards, M.D.
Newcastle-upon-Tyne‡	149,366	484	264	63	33	*	*	*	58	21	..	..	9	..	4	5	3	35	23	12	28	33.8	18.4	1.5	2.4	H. E. Armstrong.
Norwich‡	85,827	266	171	41	*	*	*	*	36	24	..	1	14	..	3	5	1	*	*	3	24	32.3	20.8	2.9	*	
Nottingham	173,627	470	371	121	65	18	18	76	73	40	..	1	13	..	17	5	4	76	31	14	32	35.3	25.2	2.7	5.2	E. Seaton, M.D.
Nuneaton	7,400	27	12	5	3	1	..	1	2	1	..	..	..	..	..	1	..	7	..	1	..	43.0	19.1	1.6	11.1	E. Peacock.
Oldham‡	125,413	354	245	57	47	12	13	71	45	23	..	2	12	1	1	3	4	88	16	3	30	32.0	22.2	2.1	8.0	J. M. Sutton, M.D.
Ovenden	8,000	..	—	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Steele.
Oxford‡	37,500	105	70	20	10	5	4	16	15	3	..	..	..	1	1	1	..	10	3	4	4	29.2	19.5	0.8	2.8	A. Winkfield.
Padiham and Hapton‡	9,000	26	21	7	4	2	..	5	3	5	..	..	2	..	..	2	1	4	1	..	..	36.1	24.3	5.8	4.6	J. G. Booth.
Pembroke	15,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. P. Saer.
Penzance	12,000	14	12	3	2	..	..	6	1	2	..	2	..	..	..	..	..	2	2	..	..	13.7	11.8	2.0	2.0	G. B. Millett.
Peterborough‡	20,000	*	29	8	1	3	2	7	8	1	..	..	..	..	1	..	..	7	1	1	2	*	15.1	0.5	3.6	W. S. Thomson, M.D.
Plymouth†	74,993	172	117	26	17	3	6	25	40	8	..	..	1	1	2	..	4	30	9	..	5	29.9	20.3	1.4	5.2	H. Greenway.
Pontypool	5,100	18	13	2	2	*	..	1	6	2	..	..	..	2	..	..	..	*	1	..	..	41.6	30.0	4.6	13.9	S. B. Mason.
Portsmouth‡	134,224	420	223	51	*	*	*	*	49	25	..	..	4	4	9	7	1	*	*	6	29	32.7	17.3	1.9	*	
Preston	88,000	230	146	55	26	9	21	26	29	10	..	..	2	..	2	3	3	23	17	3	1	30.8	19.5	1.3	3.1	H. O. Pilkington.
Ramsgate†	22,200	38	21	4	3	..	..	5	9	1	..	1	..	..	..	..	..	3	1	..	..	22.3	12.3	0.6	1.8	E. Walford.
Ravensthorpe (Yorks.)	4,560	12	6	..	..	1	..	3	2	..	..	..	..	..	..	..	..	1	..	..	..	31.0	15.5	0.0	2.6	W. Marsden.
Rawmarsh	9,652	33	15	7	1	..	1	4	2	1	..	..	..	..	1	..	..	3	2	..	..	40.2	18.3	1.2	3.7	W. J. Smith.
Reading‡	41,500	158	67	17	9	1	..	15	25	10	..	2	1	1	2	1	3	13	4	2	6	39.7	16.8	2.5	3.3	J. Shea, B.A., M.D.
Redditch	10,070	*	13	6	1	1	..	3	2	..	..	..	..	..	..	..	..	3	..	..	..	*	15.2	0.0	3.5	C. C. Smith, M.B.
Redruth	9,500	17	12	4	1	1	2	3	1	..	..	..	..	..	..	..	..	3	1	..	..	21.1	14.9	0.0	3.7	J. S. Hichens.
Reigate	18,000	33	20	5	..	2	..	4	9	..	..	..	..	..	..	..	..	4	2	1	2	20.7	12.5	0.0	2.5	E. L. Jacob.
Richmond (Surrey)	19,500	56	23	3	4	1	..	9	6	..	..	..	..	..	..	..	..	8	1	..	1	29.9	13.9	0.0	4.8	J. T. Rowland, M.D.
Rochdale	72,720	177	98	17	21	6	2	28	24	15	..	1	9	1	1	1	2	17	13	3	..	28.7	15.9	2.4	2.8	J. Henry, M.D.
Rochester	18,500	68	34	7	5	2	2	10	8	6	..	..	6	..	..	..	..	7	2	2	6	43.3	21.6	3.8	4.5	J. Sladen-Knight, M.D.
Romsey	4,481	10	5	..	1	..	..	1	3	..	..	..	..	..	..	..	..	..	1	..	..	26.2	13.1	0.0	0.0	F. Buckell.
Rotherham†	34,404	103	55	14	10	3	6	8	14	10	..	..	5	1	3	1	..	15	2	2	7	39.0	20.8	3.8	5.7	J. Hardwicke, M.D.
Rowley Regis†	27,000	99	20	5	5	1	1	3	5	1	..	..	..	..	..	1	..	8	..	2	..	47.8	9.7	0.5	3.9	J. G. Beasley.
Rugby	8,916	20	17	3	2	2	1	3	6	1	..	..	..	1	..	..	..	3	..	1	..	26.4	22.5	1.3	4.0	G. Wilson, M.D.
Runcorn	14,000	48	16	7	..	..	..	3	6	..	..	..	..	..	..	..	..	3	..	..	..	40.4	13.5	0.0	2.5	R. H. Mouritz.
Rusholme‡	12,500	28	12	2	1	1	..	4	4	..	..	..	..	..	..	..	..	..	2	..	..	23.4	10.0	0.0	0.0	J. Gregory.
Ryde	12,800	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	A. Platt Wilks, M.B.
Saffron Walden	5,942	16	5	1	..	..	..	..	4	..	..	..	..	..	..	..	..	1	..	..	2	31.7	9.9	0.0	2.0	W. Armistead, M.B.
Salford‡	185,786	629	406	105	101	30	18	92	60	83	..	36	21	4	8	9	5	107	34	7	48	35.3	22.8	4.7	6.0	J. Tatham, M.D., S.Sc.C. Camb.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1,000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet Fever	Diphtheria	Whooping-Cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence.		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Selby	5,720	23	9	1	2	..	..	3	3	1	..	..	..	..	1	..	..	1	..	..	2	47.3	18.5	2.1	2.1	J. M. Wilson, M.B., S.Sc.C.C.
Sheffield‡	304,938	981	503	127	91	*	*	*	85	50	..	6	8	1	21	11	3	142	42	8	52	33.6	17.2	1.7	4.9	T. W. Hime, B.A., M.B.
Shirley	7,000	25	9	1	1	..	..	1	6	1	..	..	..	..	1	..	..	4	..	..	..	42.8	15.4	1.9	6.9	J. H. Allden.
Sittingbourne†	9,000	29	7	3	..	1	..	2	1	..	..	..	..	..	..	..	..	2	..	2	..	42.0	10.1	0.0	2.9	H. G. Sutton.
Slough‡	5,890	20	12	2	1	..	3	1	5	1	..	..	..	..	1	..	..	1	1	..	..	35.4	21.2	1.8	1.8	A. J. Southey.
Smethwick	21,000	69	26	5	6	1	..	11	3	1	..	..	1	..	..	..	..	4	1	2	..	38.7	14.0	0.6	2.2	W. Sutton.
Southport	34,100	73	58	10	8	5	1	20	14	1	..	..	..	1	..	..	..	9	7	4	3	25.3	20.1§	0.3	3.1	H. H. Vernon, M.D.
Stalybridge	23,405	64	36	8	4	1	3	10	10	2	..	..	1	..	..	..	1	11	5	..	..	32.2	18.1	1.0	5.5	F. J. Roberts-Dudley.
Stourbridge	9,376	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. Eagar, M.D.
Stratford-on-Avon..	7,899	*	12	3	..	1	..	5	3	..	..	..	..	..	..	..	..	1	..	..	..	*	17.9	0.0	1.5	G. H. Fosbroke, S. Sc. C. Camb.
Stroud	7,608	25	9	5	1	..	1	..	2	..	..	..	..	..	..	..	..	3	..	..	2	38.7	13.9	6.0	4.6	T. Partridge.
Sunderland‡	116,730	385	262	50	69	23	14	64	42	57	..	1	42	..	12	2	..	49	21	8	20	34.4	23.4	5.1	4.4	H. J. Yeld, M.D.
Swansea	65,890	216	111	30	24	8	5	29	15	23	..	..	19	..	4	..	..	23	12	5	8	38.6	19.8	4.1	4.1	E. Davies.
Swinton‡	7,753	30	13	2	3	..	2	4	2	2	..	..	1	..	..	1	..	7	..	..	..	40.4	17.5	2.7	9.4	C. S. Blythman, M.B.
Tamworth	4,846	18	15	4	3	..	..	4	4	..	..	..	..	..	..	..	..	3	..	2	2	43.7	36.4	0.0	7.3	H. J. Fausset, M.D.
Taunton	16,227	41	23	3	5	1	..	5	9	3	..	1	1	..	1	..	..	2	3	..	8	29.7	16.7	2.2	1.5	H. J. Alford, M.D.
Teignmouth	7,250	18	4	2	1	..	..	..	1	..	..	..	..	..	..	..	..	2	..	..	..	29.2	6.5	0.0	3.2	W. C. Lake, M.D.
Tewkesbury	5,500	14	9	3	..	..	1	2	3	..	..	..	..	..	..	..	..	2	..	1	1	30.0	19.3	0.0	4.3	W. Allard.
Thornhill	10,636	29	10	5	3	..	..	..	2	..	..	..	..	..	..	..	..	3	..	..	..	32.1	11.1	0.0	3.3	W. Marsden.
Tiverton‡	10,400	98	17	..	1	1	2	6	7	..	..	..	..	..	..	..	..	2	1	2	3	28.1	17.1	0.0	2.0	J. P McNeill, M.D.
Torquay	26,000	*	21	..	1	1	2	8	9	1	..	..	1	..	..	..	..	5	4	2	..	*	9.5	0.5	2.3	P. Q. Karkeek.
Tottenham‡	37,000	140	66	23	12	5	4	11	11	6	1	3	..	1	..	1	..	17	3	2	2	39.5	18.6	1.7	4.8	C. T. Conolly.
Toxteth Park†	8,000	14	8	..	2	..	..	4	2	..	..	..	..	..	..	..	..	2	2	..	..	22.8	13.0	0.0	3.3	J. McClelland, M.D.
Tredegar	18,000	56	60	12	7	4	3	15	19	4	..	1	..	..	..	1	2	19	2	2	7	36.6	39.2	2.6	12.0	G. A. Brown.
Trowbridge†	12,000	27	21	2	10	..	..	4	5	7	..	7	..	..	..	..	..	5	1	..	..	29.3	22.8	7.6	5.4	G. C. Taylor, M.D.
Truro	11,000	28	14	3	2	1	..	2	6	..	..	..	..	..	..	..	..	1	..	1	1	30.0	15.0	0.0	1.1	E. Sharp.
Tunstall‡	15,500	48	38	14	6	1	..	13	4	3	..	..	..	..	..	..	..	11	..	..	..	32.3	25.6	2.0	7.4	J. P Edwards.
Ulverston	11,000	32	19	3	4	1	2	2	7	..	..	..	..	..	..	..	..	4	3	..	2	34.3	20.3	0.0	4.3	A. Thompson, M.D.
Walker-on-Tyne	8,000	28	21	7	5	..	2	5	2	..	..	..	..	..	..	..	..	5	2	2	..	41.2	30.9	0.0	7.4	H. F. Hurst.
Wallasey	23,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	I. Byerley.
Warminster	5,786	10	8	1	..	..	..	1	6	..	..	..	..	..	..	..	..	2	1	..	..	20.4	16.3	0.0	4.1	P. Grubb.
Warrington	40,000	133	70	15	12	4	6	21	12	6	..	2	3	..	..	1	..	20	5	3	5	39.2	20.6	1.8	5.9	J. H. Gornall.
Wednesbury‡	26,000	75	47	19	7	3	3	6	9	10	..	..	7	..	1	1	1	6	2	2	..	30.1	18.9	4.0	2.4	J. C. Garman.
West Bromwich‡	54,000	229	111	26	24	2	7	25	29	10	..	..	2	1	1	4	2	10	8	3	18	44.2	21.4	1.9	1.9	J. Manley.
West Derby	33,693	63	42	5	8	2	3	12	12	4	..	1	..	..	..	2	1	9	2	..	1	22.0	14.7	1.4	3.1	W. Carter, M.D.
Weston-super-Mare	14,000	25	11	1	2	..	1	1	6	..	..	..	..	..	..	..	..	2	..	1	..	21.0	9.3	0.0	1.7	C. V. Hitchins.
Weymouth	15,269	29	19	7	2	..	..	3	7	2	..	..	1	..	..	1	..	7	1	..	2	22.4	14.6	1.5	5.4	H. Tizard, M.D.
Widnes	22,000	40	40	17	10	3	1	7	2	2	..	1	..	..	..	..	1	17	2	1	..	21.4	21.4	1.1	9.1	W. Cooper.
Willenhall‡	19,300	45	30	4	15	2	..	4	5	15	..	..	15	..	..	..	..	8	..	2	..	24.3	16.2	8.1	4.3	W. H. Hartill.
Withington†	13,000	27	18	4	4	..	..	7	3	..	..	..	..	..	..	..	..	3	1	2	..	23.5	15.6	0.0	2.6	T. C. Railton, M.B.
Wolborough	7,300	*	10	2	1	..	..	3	4	1	..	..	..	..	1	..	..	..	..	2	..	*	16.1	1.6	0.0	L. Armstrong.
Wolverhampton†	76,000	224	94	22	12	6	1	28	25	7	..	..	4	1	..	2	..	24	2	5	16	38.4	16.1	1.2	4.1	J. H. Love.
Wombwell‡	7,500	27	13	5	3	1	1	3	..	2	..	..	..	..	..	1	1	3	..	1	..	37.6	18.1	2.8	4.2	J. N. Millar, M.B.
Workington	10,000	62	24	7	4	..	..	7	6	3	..	1	..	..	..	..	2	1	1	2	..	72.0	28.3	3.5	1.2	J. Ward, M.D.
Worthing	9,540	28	12	2	..	..	1	5	4	1	..	..	..	..	..	1	..	..	1	..	..	34.6	14.8	1.2	0.0	C. Kelly, M.D.
York	46,850	155	80	20	10	2	3	23	22	12	..	1	..	..	8	2	1	11	8	4	6	34.5	20.1	3.0	2.8	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.
‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 16.61.

and York. The average death-rate from fever in the 212 sanitary districts was considerably lower than in recent months; almost the only notable fatality of enteric fever occurred in Huddersfield, where the deaths referred to this disease, which had been one and thirty-one in the two previous months, declined to nine in December. Two fatal cases of fever were recorded in Camborne. Diphtheria caused six deaths in Luton, three in Aston Manor, three in Heywood, and two each in Devonport and Pontypool. The fatality of diarrhœa showed an excess for the season, especially in Merthyr Tydfil and Ashton-under-Lyne. Among the 112 sanitary districts, nine deaths from small-pox were reported, against but three in the previous month; six occurred in Bury, one in Burton-upon-Trent, one in Heywood, one in Maidstone, one in Merthyr Tydfil, and one in Tottenham.

The annual death-rate from diseases of the respiratory organs, excluding phthisis, averaged only 4.0 per 1,000 persons living in those sanitary districts for which this information is available, against 4.9 in November. The death-rate from lung diseases last month showed, however, excessive fatality in Ashton-under-Lyne, Merthyr Tydfil, Widnes, and Tredegar.

Infant mortality, measured by the proportion of deaths under one year to births registered, which had been equal to 290, 186, and 149 in the three preceding months, further declined to 144 in December. In the twenty large towns the death-rate of infants did not, however, exceed 38 per 1,000; consequently, infant mortality was higher in the small sanitary districts than in the twenty largest English towns, among which it ranged from 107 and 119 in Wolverhampton and Portsmouth, to 161 and 219 in Oldham and Nottingham. Among the smaller urban districts, exceptionally high rates of infant mortality prevailed in Ashton-under-Lyne, Batley, Burslem, Cheltenham, Newcastle-under-Lyne, Tunstall, and Wednesbury. Infant mortality in Ashton-under-Lyne has shown a continual excess for some months. Infant mortality, recently so excessive, showed a decline in Preston during December.

The accompanying table of mortality districts includes those for the following sixteen watering-places or health-resorts: — Bangor, Brighton, Dawlish, Dover, Eastbourne, Hastings, Ilfracombe, Littlehampton, Penzance, Ramsgate, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The return for Ryde, owing to the indisposition of the Medical Officer of Health, has not come to hand. The annual death-rate from these sixteen watering-places during December averaged only 15.8 per 1,000, against 17.8 and 18.1 in the two preceding months; and the zymotic death-rate was so low as 0.8, and showed a further decline from that which has prevailed in recent months. Exclusive of Brighton, for which this information is not available, the death-rate from diseases of the respiratory organs during last month averaged 2.5 per 1,000, and was very considerably below the average rate in the 212 sanitary districts. These statistics afford conclusive evidence of the generally satisfactory sanitary condition of these sixteen health-resorts.

The accompanying table is the last for 1880, and we propose in our next issue to summarise the twelve monthly returns for some of the sanitary districts which present features of special interest.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on December 17th, Dr. Bristowe, President, in the chair. After the minutes were read, a report was brought up from the Council on a communication received from the Charity Organisation Society, respecting the Dwellings of the Poor. As the last named Society had taken action in the matter, the Council recommended that nothing be done. They also reported on the reference to them as to 'the desirability of the investigation of cases of deaths, uncertified by a medical practitioner, devolving on a Medical Officer of Health'. The report was fully discussed, and divided into two portions, when it was resolved: 1st, that the Society is of opinion that every case of uncertified death should be reported to the Coroner by the Registrar of Births and Deaths for the sub-district in which it occurred, and that the Coroner should, if he deemed there were no good grounds for holding an inquest, direct the case to be investigated by a registered medical practitioner, who should report the result of his enquiries to the Coroner; 2nd, that the Society is also of opinion that this duty should not be cast on the Medical Officer of Health as any part of his ordinary work; and 3rd, that the Society consider the present system of investigating deaths by a non-medical coroner's officer most unsatisfactory. Dr. W. Ogle, Deputy Registrar-General, and Dr. J. W. Reid, Director-General of the Medical Department of the Navy, were elected Honorary Members. Dr. W. Stainthorpe was elected an extra-Metropolitan Member. Dr. Kingzett, F.C.S., and Dr. Dodsworth, Medical Officer of Health for Chiswick, were nominated as Associates, and Dr. Bakewell, of Hokitika, as a retired Medical Officer of Health.

Dr. W. N. Thursfield then moved the following Resolution: 'That in the opinion of this Society, it is desirable, having regard to the more effectual prevention of the spread of zymotic disease by the agency of milk, that the special sanitary supervision and inspection of cow-sheds, dairies, and milk-shops should form a part of the duties of the Medical Officer of Health and the Sanitary Inspectors of the respective districts.' Dr. Thursfield read a paper in support of his proposition, which will be found at page 243.

In the discussion which ensued, Mr. Jacob, Medical Officer of Health for Surrey, said that he had been appointed Inspector for his combined district by the Justices, and had found on inspection that the cow-sheds were in bad order, and the water in many instances bad. He and Dr. Price Jones, who acted for the adjoining district, had examined all the well-water supplying the farms, had closed many of the wells, and attended to the proper drainage and ventilation of the sheds. He had seen a great deal of the working of the Act in country places, and found it generally utterly neglected. He had explained to cow-keepers the risk they ran in employing infected persons, and had prevented their employment in ten or twelve instances. He pointed out that unless the Justices appointed the Medical Officers of Health to be Inspectors, Dr. Thursfield's resolution could not be carried out without a new Act of Parliament. Dr. A. Carpenter, of Croydon, said that he took an active part in putting the Order in Council into force in Surrey, where the Act has been actively carried out, but in agricultural districts it is a dead letter. He believed that pleuro-pneumonia would never be

checked until the Act was carried out by Medical Officers of Health. Mr. Wynter Blyth said that in Devonshire the Medical Officers of Health took no part in supervising cow-sheds, which he did not regret. He called attention to 'strangles' in horses, which resembles scarlet fever in man, and asked, is there any relation between the two? He thought that every seller of milk should heat it to boiling point by steam, so as to destroy all infection. A letter was read from Dr. Bond, stating that in his opinion dairies and cow-sheds should be supervised by Medical Officers of Health; and that, as Courts of Quarter Session and Rural Sanitary Authorities had shunted the duties, the provisions of the Act should be more actively carried out by a central committee. Dr. Tripe said that in London Medical Officers of Health have greater power as regards cow-sheds than the Inspectors appointed under the Act, as the latter have only to consider the health of the cows, whilst the former have also jurisdiction over all matters affecting the health of the surrounding neighbourhood. Dr. Robinson (Dover) considered the duties to be derogatory, and opposed to the other work of a Medical Officer of Health, which opinion Dr. Bristowe strongly controverted. Dr. Dudfield thought that all Medical Officers of Health should make themselves well acquainted with the local register, and direct some supervision to be exercised, even as regards dairies. He had written to a large number of Local Authorities, and found that, with the exception of Middlesex, Surrey, and Hertfordshire, there are no regulations in force in this country. The meeting then adjourned.

THE SEWERAGE OF BIRKENHEAD.

ON October 13th last, a labourer employed in cleansing a sewer at Birkenhead was overtaken by a quantity of sewer gas, and died before he could be removed. According to the evidence submitted at the inquest, which, owing to several adjournments, was only terminated on Nov. 25th, it appears that five men were working in the sewer on the morning of the day on which the accident occurred, the manholes having been opened for an hour-and-a-half before the commencement of work. The sewer is from 15 to 20 feet below the surface, and the gang had to proceed along it for ninety yards before commencing operations. An hour elapsed before anything unusual occurred, and then there was a rush of dirty water which seemed 'all of a boil'. The foremost of the labourers deposed to this rush being accompanied by a suffocating smell, and something at the same time 'affected his eyes'. He called to the men behind him that he should go out, but immediately afterwards lost consciousness, which he did not recover till he was in hospital. Witness, who had been at work at the sewers for eighteen months, had several times noticed a similar rush and suffocating smell, but in a less degree. The smell was certainly not that of coal gas. The lighted candles burnt brightly in that sewer. One of the labourers succeeded in escaping into the street and gave the alarm, when the foreman (at the risk of his own life) immediately descended into the sewer, and with assistance all below were got up. The deceased was found about forty yards from the man-hole. The sewer, which was three feet high by two-and-a-half feet across, contained a good deal of solid matter, eighteen inches being the maximum, which was removed by means of buckets. On the Coroner enquiring what was done with this solid matter, he was informed that it was tipped 'where there were new streets making'. Dr. Vacher, Medical Officer of Health for the borough, said he was of opinion that the fatality was due to ammonium sulphide, which was nearly always generated in standing sewage. During the many years he had resided in the town no similar accident had occurred. At the place where the men had been working, the ventilators were too far apart. The Corporation had been lately improving the ventilation of the sewers, and many additional ventilators had been recently constructed. It was true that the sewage sludge was sometimes put on waste land that required levelling up, but this was not done with his (Dr. Vacher's) consent or approval, and whenever the fact of such a deposit having been made came to his knowledge he reported it to the Health Committee and did his best to abate the nuisance. Anything that disturbed the mud in the sewers would promote the evolution of sewer gases. The Coroner asked if systematic flushing of the sewer would not prevent the possibility of the recurrence of such an accident. Dr. Vacher said many of the passage drains were now periodically flushed, and he thought it would be a great advantage if the sewers were treated in the same way. In reply to a question of the Coroner if there was any way by which a sewer might be rendered safe for men going down to remove a deposit, Dr. Vacher said he thought it would be a good practice when a sewer was opened up for cleansing to generate chlorine in it, which could readily be done by mixing acid and chloride of lime. The men would then not go down so soon after the sewers were opened as at present. They would have to wait till the chlorine had dispersed. However, he still thought that the only way of rendering sewer-air wholesome was by free ventilation and regular flushing. Mr. Thorburn, the borough surveyor, said the experiment of flushing the main sewers had been tried—it was impracticable—but he agreed generally with the opinion expressed by the Medical Officer. The 'rush' which the men had heard, was, he thought caused by the letting-in of steam from the Britannia works. The Coroner, in addressing the jury, said, it was quite clear the deceased met his death through inhaling gas generated in the sewer. He strongly pressed it upon the sewer authorities that the best and most economical method of keeping the sewers free from gas would be to have them regularly and frequently flushed. The jury, after a short deliberation, returned a verdict to the effect that the deceased had come by his death through inhaling sulphide of ammonium, adding the following presentment:—'We consider the Corporation have been guilty of great neglect, in permitting such an accumulation of sludge in the sewer as has been elicited in evidence, and that such a deposit ought not at any time to be allowed to exist.'

WILMSLOW SEWERAGE.

The Wilmslow Local Board of Health have for several years past been trying to obtain a satisfactory scheme for the complete sewering of their district, which includes the village of Wilmslow and the surrounding residential and agricultural district of 6,907 acres, with a present population of about 7,000. Before the formation of the Local Board of Health, a scheme was adopted by the Rural Sanitary Authority for gravitating sewers of large capacity and two sewage farms in the outfall valleys; but so much opposition was given by the owners of mansions and

building land near the proposed sewage-farm sites, and the whole scheme was likely to be so costly, that it was ultimately abandoned. About eighteen months since, the Board offered premiums of £100, £50, and £25 for the best schemes for sewering and disposing of the sewage of the district. A large number of plans were sent in by engineers, and Mr. J. G. Lynde, C.E., formerly City Surveyor of Manchester, was called in to advise the Board as to the engineering merits of the several schemes, and at the Board meeting on the 5th November last, the first premium was awarded to Messrs. E. Corbett and Sons, of Manchester; the second premium to Messrs. Brierly and Holt, of Blackburn; and the third premium to Mr. Vawser, of Manchester. Messrs. E. Corbett and Sons' scheme is on the 'separate system' for collecting only sewage in the new sewers, leaving the rainfall to be conveyed by existing drains, streams, etc. The Wilmslow district is on a slight ridge between the Bollin river on the north, and Birken brook on the south; the chief residential district being to the east, and agricultural land and the unreclaimed parts of Lindow Common to the west. The scheme provides for a northern and a southern outfall of 15-in. glazed earthenware pipes, jointed water-tight in cement, with branch sewers of 12-in. and 9-in. pipes. A sewage farm of about 57 acres is proposed on or near Lindow Common (where deep sand is overlaid by peat of varying thickness.) The sewage is to be raised from the two outfalls, a height of about 45ft., to the farm, by means of 'Shone's patent sewage ejectors', worked by compressed air from an engine at the farm. By this means the expense and annoyance of having two pumping stations at the outfalls is avoided, and one engineer at the farm would be able to attend to both the air compressing machines for working the ejectors and the irrigating machinery. For the present population of 7,000, estimating 20 gallons of sewage per head per day, the effective work of raising the sewage 45ft. high would only require about one-and-a-half horse power constant; but allowing for friction, leakage, and loss of power, it is estimated that an engine of six nominal horse power, working 16 hours per day, will suffice for the present demands. Messrs. Corbett propose to have duplicate engines and boilers to avoid interference with the sewage-lifting during repairs, etc. Sturgeon's patent trunk air-compressors are recommended. These would supply compressed air at about 30lbs. per square inch, which would be conveyed by iron or lead pipes to the two ejector stations, where it would discharge the sewage along 6-in. pipes up to the farm. An air accumulator would be provided at the farm, of 2,000 cubic feet capacity, like a boiler shell, capable of bearing 60lbs. pressure per square inch. Each evening the air-compressing engines would be run at speed to fill the accumulator, and the air thus stored at high pressure would serve to eject the moderate quantity of sewage flowing during the night, thus saving the cost of having an extra man for night attendance at the boilers and engines. The estimated cost of the whole scheme is as follows:—19,095 yards of pipe sewers, and 170 man-holes, £6,500; air compressing engines, boilers, ejectors, rising mains, air pipes, and buildings, £4,250; sewage farm, farm buildings, drainage, etc., £4,800. Total, £15,550.

Waterworks are being constructed for the supply of Kirkby Stephen (Westmoreland), from the designs of Mr. Somes Story, County Surveyor of Derbyshire. A copious spring is the selected source.

THE DISPOSAL OF TOWN REFUSE.

THE report presented to the Liverpool Corporation by the Chairman of the Scavenging Sub-Committee contains the following remarks in reference to the disposal of town refuse:—

'Since the commencement of the last year the experimental knowledge of the Health Committee has been advanced one step further with regard to the best and most economical means to be adopted for the final disposal of those products of scavenging operations which possess no value to the farmer. In 1879 the Council sanctioned the purchase of a steam-hopper barge to be used for the purpose of conveying to sea a large quantity of unsaleable refuse collected from the south end of the city, similar in character to that which had been previously got rid of by being utilised for raising the levels of proposed new streets, or had been sent at considerable cost to fill up marsh lands abutting upon Bromborough Pool and the Lancashire Canal. The tender of Messrs. Simons and Co., of Renfrew (£7,400), for building the barge in accordance with plans prepared by the then borough engineer (Mr. G. F. Deacon), was accepted. So soon as arrangements for the registration and equipment of the vessel (which had been named Alpha) had been completed, the trial trip was made (see SANITARY RECORD, March 15th, p. 342), and she has since been regularly employed, except for a few days, when, through stress of weather, it was not safe for her to proceed to sea. The results of the working of the Alpha for three months are detailed below, together with a statement of the cost incurred on the disposal of Southend refuse by canal during the corresponding period of 1879. Disposal of refuse from the Southend by ordinary barges, to land on the Lancashire Canal, from Feb. 1st, 1879, to April 30th' 1879, 2,425 tons at a cost of 2s. 7¼d. per ton; disposal of refuse from the Southend by steam-hopper barge Alpha, about four miles beyond the North-West Lightship, and in not less than 16 fathoms, from Feb. 1st, 1880, to April 30th, 1880, 9,650 tons at a cost of 1s. 6¾d. per ton. The total cost per ton in each case comprises all charges except rent for dock accommodation, and includes the cost of loading, which has chiefly been by manual labour. Arrangements are now pending with the Mersey Docks and Harbour Board, by which a berth space, having sufficient and convenient quay accommodation, will be assigned for the use of the barge, and thus admit of steam or hydraulic power being employed for loading. This, when accomplished, will probably be the means of a further saving being effected. It must be observed that the saving in cost, as indicated by the comparative statement, is to be regarded as relative rather than absolute, because, owing to failure of available places of deposit in the city, the quantity of refuse so disposed of at a trifling cost near the Southend was only 3,316 loads for the three months of 1880, against 9,732 for the same period of 1879. In a short time all the refuse from this division will have to be disposed of by the barge. It is to be expected that the cost per ton for the disposal of the refuse by the Alpha will be further reduced as the necessity arises for a larger quantity to be got rid of at sea, because, with the exception of two cargoes that had to be sent up the canal during the time the steam-hopper barge was prevented by weather from making her regular trips, she has carried all the refuse sent to the south wharves, so that her capability of making a greater number of trips has not yet been thoroughly tested.'

REPORT OF THE JUDGES OF THE SANITARY EXHIBITION HELD AT EXETER.

SEPT. AND OCT. 1880.

The judges appointed by the Council of the Sanitary Institute of Great Britain, have recommended to the Council the following distribution of Medals and Certificates.

MEDALS.—John Carter, 6A, New Cavendish Street, Portland Place, London, W., for Invalid Furniture; Colman and Glendenning, Chalk Hill Works, Norwich, and 62, St. Martin's-le-Grand, London, E.C., for School Furniture; N. Hunt, 43, City Road, Bristol, for his Patent System of Auto-pneumatic Ventilation; Josiah Moore, Sekford Works, St. James's Walk, Clerkenwell, London, for Glass Louvre Ventilators; L. Moser, Southampton, for Dry Closet, suitable for Ashes or Disinfecting Powder; Sanitary and Economic Supply Association, Limited, Gloucester, for Dr. Bond's Patent Euthermic Ventilating Gas Stove; J. Tylor and Sons, 2, Newgate Street, London, for Patent Flushing Rim Lavatory Basin and Apparatus; H. Chalk Webb, Worcester, for his Method of Impregnating Wood with Colours in Patterns; The Wilson Engineering Company, Pear-Tree Street, Goswell Road, London, for the Wilson Portable Close Cooking Range.

SILVER MEDALS (*Given by the Exeter Gas Company*).—Four Silver Medals were offered by the Exeter Gas Company for the best Gas Stoves exhibited under the following classes: 1. For the best Gas Stove or Gas Apparatus for Cooking Purposes for Families, including a sufficient supply of hot water. 2. For the best Gas Cooking Stove for an Artisan's Family of from four to eight persons. 3. For the best and most Economical Open Gas Fire. 4. For the best Heating Arrangement for general purposes, among which are included the best Methods for Heating Baths; the Judges recommend that one of these Medals be awarded to the Sanitary and Economic Supply Association, Limited, Gloucester, for Dr. Bond's Patent Euthermic Ventilating Gas Stove. They regret, after careful practical trial, that they cannot award Medals for any of the Gas Cooking Stoves or Bath Heaters; and refer for further practical trial, Messrs. Verity's Open Gas Stove, exhibited by Messrs. Willey and Co.

CERTIFICATES.—They further recommend that Certificates of Merit be awarded to the undermentioned Exhibitors:—P. Hinckes Bird, 1, Norfolk Square, London, N.W., for Large Legible Spirit Thermometer; Branksea Island Pottery and Co., Limited, Poole, Dorset, for Stoneware Pipes; British Sanitary Company, 205, Buchanan Street, Glasgow, for Patent Self-Acting Earth-Closet; William Brock and Co., 177, Fore Street, Exeter, for 'Non-Such Adjustable Chair'; William Brock and Co., 177, Fore Street, Exeter, for Bed-Rest with Moveable Arms; F. C. Calvert and Co., Bradford, Manchester, for Improved Vapouriser for Disinfecting; Candy and Co., Newton Abbot, for 'Granite Vitrified' Bricks and Paving; Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for the 'Sunlight' Stove; Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for Excelsior Patent Spring Mattress; Chorlton and Dugdale, 19, Blackfriars Street, Manchester, for Invalid's Adjustable Bed; Colman and Glendenning, Chalk Hill Works, Norwich, for Patent Automaton Seat for Drapers; T. J. Constantine, 61, Fleet Street, London, E.C., for the Devonshire Cooking Range; J. M. Craig, Kilmarnock, N.B., for Buchan's Patent Trap; H. Doulton and Co., Lambeth, London, for Patent Antipercussion High Pressure Draw-off Valves; H. Doulton and Co., Lambeth, for Stanford's Patent Joints for Stoneware Pipes; Garton and King, 190, High Street, Exeter, for Vowel E. Bradford's Patent Family Washing Machine; F. and C. Hancock, Dudley, Worcestershire, for Dough Kneading Machine; F. and C. Hancock, Dudley, Worcestershire, for New Propeller Churn; *W. Lascelles, 121, Bunhill Row, London, for Concrete Bath in one piece; P. A. Maignen*, 20 and 23, Great Tower Street, E.C., for Patent Filtre Rapide; Maignen, 20 and 23, Great Tower Street, for 'Bijou' Filtre Rapide; J. B. McCallum, Borough Surveyor, Stafford, for Improved 'Non-Absorbent' Tub or Pail Van; J. Parker, Woodstock, Oxon, for Dry-Earth Commode without Separator; G. E. Pritchett, 20, Spring Gardens, London, for Corrugated Iron Hot Water Warming Appliances; G. E. Pritchett, 20, Spring Gardens, London, for Improvements in Thermometrical and Barometrical Instruments; Salmon, Barnes and Co., Canal Head Foundry, Ulverston, for Revolving Shutters with Patent Balance-Weight Motion; C. H. Sharp and Co., 104, Newgate Street, London, for Ornamental Inlet Ventilators; Silicated Carbon Filter Cempany, Battersea, for Silicated Carbon Double-Chambered Table Filters; J. Tylor and Sons, 2, Newgate Strset, E.C., for Improved Enamelled Iron Slop Sink with Patent Regulator Supply Valve; J. Tylor and Sons, 2, Newgate Street, London, E.C., for Patent 'Waste-not' Regulator Valve; J. Tylor and Sons, 2, Newgate Street, London, E.C., for Improved Full Way Stop Valve; Willey and Co., Gas Engineers, Exeter, for their exhibit of Gaseliers and Gas Brackets; *Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Moule's Earth Closet; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Ransome's Artificial Stone Air Brick; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Conservatory Boiler, with Hot-water Pipes; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Cottage Range; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Fenby's Patent 'Paragon' Camp Furniture; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Chappuis' Daylight Reflector; Wippell Bros. and Row, 231 and 232, High Street, Exeter, for Improved Housemaid's Box with Sifter.

There are two classes of exhibits which they recommend should be excluded from awards of Medals—namely, those which were exhibited at Leamington, Stafford, or Croydon, and to which a Medal was then awarded; some of which they recommend should receive Certificates, and these they have distinguished in the foregoing lists by asterisks; and secondly, objects exhibited or invented by any of the judges themselves, such as Mr. Rogers Field's Self-Acting Flush Tank and Annular Flushing Syphon, exhibited by Messrs. Bowes, Scott, and Read, Broadway Chambers, Westminster.

The following are deferred for practical trial:—

Wall Papers.—W. Woollams and Co., 110, High Street, London, W., Paper Hangings Guaranteed Free from Arsenic; Cotterell Bros., Clare Street, Bristol, Non-Arsenical Paper Hangings, and Non-Poisonous Colours.

Machinery.—Crosley Bros., Great Marlborough Street, Manchester, Patent Otto Silent Gas Engine.

Water-Closets—Valve-Closets.—Doulton and Co., Lambeth, London, Lambeth Valve Closet; J. Tylor

and Sons, 2, Newgate Street, London, Patent 'Clear Way' Regulator Valve Water Closet, with Patent Parallel Pull.

Wash-out Closets.—Doulton and Co., Lambeth, London, Flush-out Closet; D. T. Bostel, 8, Golden Lane, London, Brighton Excelsior Closet; William White, 30A, Wimpole Street, London, Patent Water-Closet Flushing Basin with Valveless Waste-Preventing Apparatus.

Hopper Closets.—Doulton and Co., Lambeth, London, Hopper Closet; J. Tylor and Sons, 2, Newgate Street, London, Seat Action Waste-Preventing Cistern Water-Closet.

Urinals.—J. Tylor and Sons, 2, Newgate Street, London, Patent Wash-out Urinal Basin.

Sewage Treatment.—J. A. Stephan, Rainbow Hill, Worcester, Carbonised Iron Stone Mound Filters.

Water-Supply Apparatus.—A. T. and W. J. Bean, 22 and 23, Great Tower Street, London, Patent Flushing Valve and Waste Preventer, and Patent Direct-Acting Valveless Waste Preventer.

Ball Valves.—G. T. Tonks, 62, Rea Street, Birmingham, Meakins's Patent Ball Valve; J. Willoughby, 11, Seaton Terrace, Mutley, Plymouth, Ball Taps; Doulton and Co., Lambeth, London, High Pressure Ball Valves; William White, 30A, Wimpole Street, London, Bib Taps and Ball Valves.

Stoves, etc.—Doulton and Co., Lambeth, London, Ventilator Tile Stove; Willey and Co., Exeter, Verity's Patent Gas Fire; R. H. Griffin, 40 and 41, Kirby Street, Hatton Garden, London, Patent Ventilating and Heating Register Stoves; A. Hutchinson and Co., 3 and 4, Great Winchester Street, London, India-rubber Gas Tubing.

Foods.—J. S. Fry and Sons, Union Street, Bristol, Specimens of Chocolate and Cocoa.

Filters.—The Sanitary and Economic Supply Association (Limited), Gloucester, Dr. Bond's Patent Regulating Filtering Cistern.

Mineral Waters.—Carter and Co., Old Refinery, Bristol, Mineral Waters and other Beverages; G. H. Skinner, 13, North Street, Exeter, Mineral Waters and other Beverages.

Disinfectants.—Eugene Rimmel, 96, Strand, London, Oxonised Preparations; F. C. Calvert and Co., Bradford, Manchester, Carbolic Acid and Preparations of it; Jeyes and Co., 54½, Bishopsgate Street, London, Jeyes' Perfect Purifier; G. D. Simpson, 21, Mincing Lane, London, Seaweed Preparations; Mackey, Mackey and Co., 2, Bouverie Street, Fleet Street, London, Disinfectant Preparations.

Until the deferred trials have been made, the Judges are unable to recommend the award of the Richardson Medal.

(Signed) W. H. CORFIELD (Chairman),
H. C. BARTLETT,
W. EASSIE,
ROGERS FIELD.

E. Marchand writes in the *Bied. Centr.*, 1880, 466—468, that the great variations in the analyses of milk by different chemists are due, according to the author, to the abnormal conditions of the cow, the various times of milking, or defective methods of analysis. Only in the case of the fat does the quantity show any great variation (2.7 or 8.2 per cent). To estimate the fat, milk is treated with moderately dilute acetic acid, which dissolves the casein, and allows the fat to be filtered off; or the fat is dissolved out by shaking with ether.

THE PREVENTION OF SMOKE AND THE DIMINUTION OF FOG IN GREAT CITIES.

A SEVENTH meeting of the members of the Fog and Smoke Abatement Committee of the National Health and Kyrle Societies was held at the Society's rooms, 44, Berners Street, on Wednesday, December 15th. The chair was taken by Mr. Ernest Hart, who was supported by Mr. J. L. Whittle, Mr. W. R. E. Coles, Mr. Saxon Snell, Mr. R. Harris, Miss Octavia Hill, Miss Kate Potter, and other members of the Committee.

The names of the following gentlemen, who had expressed a desire to be enrolled as members of the Committee, were formally read over to the meeting and approved:—Professor Frankland, F.R.S., and Professor Abel (Royal Arsenal), members of the Committee of Experts; Colonel Festing, R.E., Science and Art Department, South Kensington; Colonel Stuart Wortley, Curator of the Patent Museum, South Kensington; Mr. Kegan Paul, and Mr. Charles Mitchell, members of the General Committee.

It was stated that a communication had been received from Sir Frederick Pollock, who had sent a donation of £5, and expressed his intention of attending the Mansion House meeting. He had also proposed, as a Member of the Committee, Mr. John Fletcher Moulton, F.R.S., whose election was unanimously approved.

The CHAIRMAN moved that the Committee hitherto known as the Committee of Experts should henceforth be known as the Executive Sub-Committee, a title more expressive of the work with which they would be mainly charged, viz., the whole arrangement of the details relating to the South Kensington exhibition, and testing operations connected therewith.

It was, after discussion, agreed that this Sub-Committee should henceforth be known as the Executive Sub-Committee.

The CHAIRMAN stated that among a large number of communications which had been received was the following interesting letter from the Rev. Septimus Hansard, Rector of Bethnal Green:—

My experience of the smoke nuisance may be of some use to your society and to the public. When first I came to Bethnal Green I was told that not a blade of grass would grow on my lawn, and I was laughed at for hoping to grow flowers. This was sixteen years ago. The rectory house is situated alongside the churchyard of the parish—garden, yard, and all making some 3½ or nearly four acres of comparatively open space. But the whole is surrounded by houses and streets. Immediately around the churchyard and rectory, some within stone's throw, two at the side of my garden, were eight manufacturing chimneys, all very low, some not above the roofs of the neighbouring houses, which here are very low. About that time the duty of enforcing the Smoke Nuisance Act had been transferred to the police. Whenever any smoke issued in the course of day or night from their chimneys, I made a note of it, and of the time they smoked. Very soon it became known to my poorer neighbours that I could stop the smoke nuisance. Asthmatic invalids, women who put out their clothes to dry, and other such sufferers, complained of this or that chimney. From all parts of this large parish of Bethnal Green I have received numerous complaints any time these last ten years. I also have, and still note, any chimneys in the parish, as I am walking about in it, which smoke.

Of all these I report to the police, to the Smoke Inspector, or the Inspector at the Police Station. I have sometimes written three letters a week to them on the subject. This is the result, that for years past I have

had a lawn on which croquet and lawn tennis are played—better than any lawn I see in the suburbs miles away from London. I can grow, some to perfection, thirty-nine annuals, and lilies I can cultivate in the open border more perfectly than many who live in the country. Among the lilies I may mention such as the lilium auratum, rubrum, roseum, the 'yellow flag', the 'white lily', and scores of others. I have had the asphodel flowering in my gardens and the Greek acanthus. I would match my Indian pink, and phlox Drummondii against any grown in the suburbs.

Now, air that is good for the lungs of flowers in London, is good for the lungs of men. And what one resident of position can do in one parish another can do. What the police do in one parish to enforce the law, they can do in another. They cannot be everywhere, and the one inspector cannot be watching all the factory chimneys on his beat, but he can receive information from those who are annoyed by the infringement of a law made for their benefit. And further, my experience is that the owners of the chimneys, when the nuisance has been pointed out to them, are willing to do their best to abate it—at least most of them.

I conclude, that while your excellent society is attacking the nuisance of smoke from private houses, they should insist upon the present law being worked, and that it should be extended. Lambeth Potteries are exempt, I believe, to the cost of the public purse, as may be seen in the condition of the Houses of Parliament. All the chimneys bordering on, or alongside, Victoria Park on the east side are exempt. And so are the Stratford chimneys; and why should the Government Woolwich factories be exempt? Anyone who has seen them belching forth columns of smoke, blackening with their soot the whole line of the Thames to London, will not wonder at the question.

It is these outlying places which send out the dense clouds of smoke which thicken the filthy compound of London fog when the wind is in the east, to the misery of all London. The houses in the east end of London are not the offenders; our fires are few and small; and on Sundays when all the fires are lit for Sunday dinners, and the factory fires not smoking, except certain sugar bakeries in Whitechapel, the air is as clear and the sky as blue as in Hyde Park or Kensington. If I have not tired you I will mention that on one occasion I wrote privately to the Chairman of the Great Eastern Railway Company, about a chimney (factory) of the Company's that smoked. Mr. Parkes wrote back directly to say for the future it should burn smokeless coal. This is some years ago. Jets of steam are often thrown up, but no smoke now.

I may also mention that my friend, the late Mr. Charles Buxton, told me that their smoke-consuming apparatus, a very simple one, saves the brewery 3 per cent. in coal. This being so, it is no hardship to compel the chimneys to obey the Act, and to help the smoke inspector in his duty.

I should be glad when I return from Brighton (recovered from the effects of late fever) to give any help to the Society, and in summer, to show them my garden of lilies, and the classes of school-children learning botany from living specimens of wild flowers, introduced in my churchyard by myself for this purpose.

The CHAIRMAN stated that, although the Lambeth potteries were exempted by Act of Parliament, in consequence of the difficulty of making the low kilns consume their own smoke, Messrs. Doulton, in their potteries, succeeded in consuming nearly the whole of their smoke, and the smoke which was seen in the neighbourhood of the Lambeth potteries came not from Messrs. Doulton's but their neighbours' kilns. He (the Chairman) had inspected Messrs. Doulton's manufactory, and found that very little smoke was emitted.

Mr. J. L. WHITTLE explained that the potteries, since 1856, were not exempt, but were included in the Smoke Abatement Act of that year.

The CHAIRMAN reported that communications had been received from Mr. B. H. Thomas, Secretary to the Anthracite Coal Colliery proprietors, giving particulars of a meeting of this body held at Swansea on the 2nd instant, at which resolutions were passed pledging their assistance, and expressed their intention of raising funds to meet the expenses attending the work of the Committee, also of applying to the Great Western, London and North Western, and Midland Railway Companies to ask for their co-operation with the colliery owners, etc., towards securing an adequate supply of anthracite and other smokeless coals to the metropolis, and of asking them to contribute to the fund. A later communication had been received from Mr. Thomas stating that upwards of £100 had been already subscribed, and with a wish that the Anthracite Coal Colliery proprietors might be represented to inspect the testing of anthracite coal.

Mr. W. R. E. COLES reported that he held communications from Messrs. Nixon, Taylor and Co., 57, Gracechurch Street, in respect to their Navigation coal, which was used exclusively on board Her Majesty's yacht, a quantity of which they would be glad to place at the disposal of the Committee, and otherwise to assist them. Also a like communication had been received from Messrs. Cory Bros. and Co.

Mr. SAXON SNELL described the ill effects he had experienced from burning bad anthracite coal, and thought it would be of great importance if the public were told where they might get good anthracite coal.

Mr. W. R. E. COLES stated that Mr. Saxon Snell's experiences were undoubtedly owing to bad coal. Lady James had used anthracite coal and spoke highly of it.

The CHAIRMAN said the only thing the Committee could do in this matter was to continue what they had already done, viz., in reply to any communication addressed to them from persons requiring anthracite coal, they would put them in the way of obtaining reliable anthracite coal from proper sources. In the meantime they did not propose to confer a monopoly on any kind of coal.

The CHAIRMAN stated that a large number of letters had been received from inventors of stoking furnaces, etc. Also replies had been received from the following vestries: St. Saviour's, Southwark, St. Pancras, St. Martin's-in-the-Fields, and Hampstead, all of which had referred the matter to their sanitary authorities for consideration and report. A communication had also been received from Hackney Vestry stating that the Act was being effectually enforced in that parish.

Mr. W. R. E. COLES reported with reference to Kensington Vestry, that they had taken some action; they had had a discussion on the smoke nuisance and advised a memorial to the Home Secretary. Mr. Campbell and the Hon. Mr. Carr Glyn, were both in favour of the action taken by this Committee, and Mr. Campbell had suggested that it would be well for the Committee to hold a meeting in the Vestry Hall at South Kensington, and either Mr. Campbell or the Hon. Mr. Carr Glyn would preside.

The CHAIRMAN stated that it was proposed they should hold a meeting at the Kensington Town Hall, and that influential members of their Committee who were willing, should attend to explain to the inhabitants of Kensington the objects of the Committee. They also proposed having a meeting at Blackheath, and the Rev. Brooke Lambert and Mr. H. C. Burdett had promised to help.

The CHAIRMAN proposed they should likewise have an East End meeting and suggested that the

Revs. S. A. Barnett and Septimus Hansard should be asked to co-operate.

Mr. W. R. E. COLES reported that a letter had been received from Mr. Robert Hunt, F.R.S., who was of opinion that the remedy for furnaces was better stoking, and for domestic fires feeding from below.

The CHAIRMAN stated that the authorities at South Kensington had very kindly given them permission at once to take possession of the place, and had given them the use of what was known as the Swedish Schoolroom as an office to prepare the exhibition, where communications might be addressed to Mr. Ingram, the Clerk of the Committee, or to the officers of the National Health and Kyrle Societies, 44 Berners Street. A circular had been drawn up inviting the various classes of persons interested in this exhibition to send in their applications, of which the following is a copy—

The Joint Committee appointed by the National Health and Kyrle Societies, with the view of abating the excessive production of smoke in London, have arranged, by the permission of Her Majesty's Commissioners for the Exhibition of 1851, of the Lords of the Committee of Council on Education, and of the Council of the Royal Horticultural Society, for an Exhibition to be held in the buildings erected for the International Exhibition of 1862, of improved fire grates, furnaces, kitcheners, cooking, warming, and other apparatus of all kinds, devised to prevent smoke, or to consume smokeless fuel. The Exhibition will also include varieties of bituminous and anthracite or smokeless coal, and of special fuels for household fires and for furnaces.

Arrangements have also been made for testing the efficiency of such apparatus, where such tests are considered desirable, and for ascertaining the relative values of the various kinds of fuel for household and manufacturing purposes, and of the extent and the manner in which they can be used so as to prevent as far as possible the production of smoke. Trials of various fuels and appliances will also be made upon a larger working scale in certain metropolitan factories, in which facilities are offered by the proprietors. It will be generally felt that such an exhibition and such testing, carried out under the direction of a skilled Committee of Experts, will be of national value—

1. By tending directly to a better utilisation of coal and coal products.

2. By determining practically and scientifically the means which are actually available for heating houses, as at present (and as may be) constructed, without producing smoke.

3. By enabling the Committee to thoroughly examine the subject generally, and report, for public information, upon the relative adaptability of the various coals and appliances to the different requirements of every class of the community.

4. By affording reliable information upon which to base sufficient and equitable amendments of the existing laws regarding smoke.

5. By enabling the Committee to ascertain and make known the comparative value of existing appliances for the utilisation of gas for the purpose of heating, and generally bringing together the available material for determining how far smoke may be prevented, and of testing numerous inventions, many of which are very little known.

The public, stimulated by the experience of recent years, is keenly alive to the necessity for smoke abatement, and it is felt that no more valuable opportunity than the present could be found for reviewing existing resources and extending their usefulness.

Communications from intending exhibitors, donors, and others, should be addressed to Mr. Robert Ingram, Clerk to the Committee, Exhibition Buildings, Queen's Gate, South Kensington.

Mr. W. R. E. COLES stated that letters had been received from Birmingham and other large towns showing a desire to combine with this Committee.

The CHAIRMAN said Mr. Coles had been in communication with Mr. Sandeman, and had informed him that the Committee would be happy on their part to give the Paris Committee any assistance, and should be glad of any assistance they could afford them. He wished it to be thoroughly understood that the Committee were not specially advocating the use of smokeless coal, but the introduction of any method that would utilise all kinds of coal. He did not consider this at all Utopian. He had lately seen a stove using, on an average, only twenty-nine pounds of coal per week, which had been in use for two years without requiring the chimney to be seen to. It was a tile stove, which burned ordinary bituminous coal. The radiating surface was very hot, but the chimney, which was only six inches off, was almost cold, and no heat escaped up the chimney. It could be purchased at a price from £3 upwards, and was a great improvement. What they further wished to arrive at was the means for utilising the present grates.

The LORD MAYOR presided at the Public Meeting held at the Mansion House on the 7th inst., at which resolutions were passed in reference to the fog and smoke nuisance of London, and approving of the proposal of the Joint Committee of the National Health and Kyrle Societies to hold an Exhibition of the various smokeless coals and other fuels, and of various appliances applicable to household and manufacturing purposes for the reduction of smoke, and to test the same, in order to demonstrate for public information the means practically available to secure that object. DEAN STANLEY, Mr. SHAW-LEFEVRE, Sir UGHTRED J. KAY-SHUTTLEWORTH, Mr. W. SPOTTISWOODE, F.R.S., and Mr. ERNEST HART, were among the speakers.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

ABERGAVENNY.—During 1879 substantial progress was made in the sanitary improvement of this borough. The preliminaries for a large drainage scheme are being carried out, the excrement receptacles have been improved, dilapidated houses are being pulled down, and nuisances are being repressed. Building operations were active throughout the year, and the class of houses erected was, for the most part, good and substantial. Dr. Steel reports, however, that the 'standing nuisance of slaughter-houses, ill-constructed, ill-found, and improperly located, continues'; and it is to be hoped that now the subject has engaged the Town Council's attention, something will be done to put a stop to this evil. The death-rate of the town on the estimated population was 21.5 per cent. per 1,000, which much exceeded that for 1878. Zymotic diseases were only slightly prevalent; whooping-cough was prevalent during the last half of the year, and especially during the last quarter. Only three deaths were registered from the seven principal zymotic diseases; but the mortality from consumption was 50 per cent. over the average of the last ten years, and that from diseases of the respiratory organs was also over the average.

BOURNEMOUTH.—The statistics of this favourit-health resort must needs be regarded with peculiar interest. It appears from Mr. Nunn's report

that whilst the total death-rate of the district was 21.4 per 1,000 in 1879, the rate amongst residents was only 12 per 1,000; 123 out of the 279 deaths being those of visitors. Eighty-two deaths occurred in children under 5 years of age; and 62 in persons aged 60 years and upwards. One death occurred from small-pox (an imported case), 4 from scarlet-fever, 1 from measles, and 14 from whooping-cough; all the latter being in young children under 5 years of age. The sanitary condition of the slaughter-houses is reported as being 'anything but satisfactory', and many of the wells in the outlying districts have been certified as unwholesome. It appears that of late years a great tendency has been developed to cut down the pine trees, which are one of the features of Bournemouth. If this suicidal policy continues, Bournemouth will soon lose its now high reputation as a health resort, and it seems hopeless to appeal to the good feeling of those who are responsible for this hewing down of timber, if a much stronger influence—that of their pockets—has not restrained them.

CHAILEY RURAL.—Mr. Gravely's long ill-health has considerably delayed the presentation of his report for 1879, which deals in fact with but little more than individual inspections and nuisances. The corrected number of deaths in the district last year was 141, against 161 in 1878. These figures are equal to a death-rate of 14 per 1,000. The deaths from zymotic diseases numbered 19, against 28 in 1878. The schools of the district still need improvement in several respects.

ERITH.—A district with many insanitary conditions to contend against is Erith—some readiiy removable by local action, others much more difficult to get rid of. The evil-smelling factories on the banks of the Thames pour their effluvia with especial vehemence into Erith, and although the Local Board has done its best to secure an abatement of the nuisance, it would appear as if nothing short of Imperial interference would be of substantial avail. Another evil, more within the domain of the Authority, is the want of drainage. Building operations are being carried on to a considerable extent; but the houses have to be drained into cesspools, because no drainage exists in their neighbourhood. Plans have, however, been prepared for the sewerage of the whole place, and it is to be hoped that no unnecessary delay will be allowed to take place in carrying them into effect. More energetic measures, too, might, with advantage, be taken in getting unwholesome wells closed. Mr. Jessett gives the corrected mortality of the district for 1879 as 12.5 per 1,000. Thirty-eight deaths out of a total of 165 occurred in children under one year, and 50 were of persons above the age of 60 years. Scarlatina, which caused 11 deaths, seems to have been the only zymotic disease that was unduly prevalent.

EXMOUTH.—Mr. Ward's valedictory report is a very good one. He soundly rates the Local Board for their apathy and neglect, and tells them plainly how many sanitary improvements still need to be carried out by them. Thus, while the Authorities have reconstructed the esplanade, and paved the side-walks of the streets, they have neglected to effect some much needed improvements in the sewers; they have not provided a disinfecting apparatus, nor any isolation for cases of infectious disease occurring in the town or brought into the port. The death-rate of the district is reported to have been for 1879 at the high rate of 24.16 per 1,000. The mortality was almost entirely at the two extremes of life; 27 out of the 145 deaths being of infants under one year, and 60 being amongst persons over 60 years. Exmouth seems, indeed, to be a favourite resort for persons in the decline of life. 'An almost complete absence' of zymotic disease is reported, though two deaths from enteric fever, and probably some other (non-fatal) cases, make us rather sceptical as to the accuracy of this description. There were 15 deaths from phthisis, and no less than 40 from bronchitis and pneumonia, the greater number of which were among elderly people, whom Mr. Ward describes as 'simply killed by cold'.

HAMPSTEAD.—Dr. Gwynn, in making his first Annual Report as successor to the veteran Mr. Lord, has fallen into the mistake of giving the statistics for the financial year 1879-80, instead of for the calendar year. Dr. Gwynn has done this in order to make his report contemporary with the other reports published in the same volume; but the objections to such statistics are numerous and weighty, and we trust that Dr. Gwynn may see fit in future to make his figures readily comparable with those of other districts, by taking the calendar year as the period for making up his returns. During the fifty-two weeks ended March 27, 1880, the births registered in Hampstead numbered 1,046, and the deaths 595. On an estimated population of 45,500, these numbers give rates equal to 22.98 and 13.07 per 1,000—both of which are unusually low. The deaths of children under 5 years amounted to 200, or 33.6 per cent of the total deaths. The fatal cases of zymotic disease numbered only 40, or at the rate of .87 per 1,000 of the population. Of these, 2 were of small-pox, 4 of scarlatina, and 6 of diphtheria. The cases of the latter disease are reported to have been 'scattered and sporadic'. Dr. Gwynn has some observations on the much-vexed question of the London water, as well as on the proper housing of the poor, a subject which is of very particular importance to Hampstead, in view of the rapid increase there of buildings of a cheap class. It is a pity the mortuary provided by the Burial Board at Fortune Green Cemetery is not more used.

LYTHAM.—There is but little information in Dr. Pountney's report for 1879 on this seaside resort, though it is true there is not much to record. He states that during the year the system of drainage has been greatly improved; but that his suggestions for more efficient ventilation near the outlet of the sewer have not been carried out. Many of the ashpits of the old dwellings have been 'drained and covered over', and the houses newly erected are to be similarly treated. We do not understand the reasons for Dr. Pountney's advice that ashpits should be drained, since such structures ought to be made of small capacity and above ground, so as to be readily cleaned out at frequent intervals. During the three or four months following the breaking up of the frost of last winter, there was an unusual amount of sickness; but throughout the summer months the health of the district was very satisfactory. Only 6 deaths occurred from zymotic disease, against 14 in 1878. The number of registered births was 91, and of deaths 89; the births thus exceeding the deaths by two only. The general death-rate was 17.8 per 1,000, as compared with 17.4 in 1878. It is unfortunate and short-sighted that the proposal to erect a sanatorium should have been abandoned.

NEWCASTLE-ON-TYNE.—In this borough there were 5,381 births and 3,458 deaths in 1879, these

figures being equal to rates of 36.6 and 23.5 per 1,000, both less than the average. The deaths of infants under one year of age numbered 784, as compared with 888, 842, and 971 in the three previous years. Zymotic diseases caused in all 625 deaths, 284 of which were from scarlatina alone. Mr. Armstrong does not state why only 8 cases of this disease were removed for isolation to the Corporation Fever Hospital; but the existing building seems very defective in many respects. An interesting outbreak of scarlatina, due apparently to infected milk (all the houses affected being supplied by one particular dairy), is reported at length in the report. Enteric fever caused 33, measles 98, and diphtheria 4 deaths; 7 cases of the latter disease occurring in one family. Sanitary work appears to be well sustained in the borough, though the action taken by the Council under the Act of 1878 to amend the condition of the dairies seems to have been very feeble. Since July 1879, the Medical Officer has examined all plans for proposed new buildings with regard to sanitary improvements, and has initialled those that he approved—a most important duty which should be imposed upon Officers of Health throughout the kingdom. The report, which contains several well-executed disease maps and charts, concludes with an admirably written essay on 'infectious diseases, the causes of its spread, and the possibility of its extension', in which Mr. Armstrong argues at length in favour of the compulsory notification of infectious disease, and greater stringency in other directions.

POPLAR.—The Medical Officers of Health for this district still continue the objectionable arrangement of making their reports up to March 31 in each year, thus destroying all opportunity of useful comparison with other districts. In Dr. Corner's (South) Division, there were 2,124 births, and 1,084 deaths during the twelve months ended the 31st March last, equal to rates of 36.8 and 18.8 per 1,000. More than half the total deaths occurred in children under 5 years of age. Of the zymotic diseases fatal to young life, scarlatina, measles, and whooping-cough were the most prevalent. Twelve cases of small-pox, 140 of scarlet fever, 16 of typhoid, and 1 of typhus fever were reported in this district during the year, and the necessary steps were taken, as far as practicable, for disinfection, isolation, etc. Considerable reduction in the nuisance from the factories of the district has been effected by the special inspector appointed for the purpose. Mr. Talbot's report on the North district is shorter, and gives less details of work done during the year. It appears from the tables at the end of the report, that 4,174 births and 2,565 deaths occurred in the district, the death-rate being apparently 20.6 per 1,000. Zymotic diseases caused in all 372 deaths, 83 being due to measles, 76 to scarlet fever, 27 to fevers, 26 to diphtheria, and 91 to whooping-cough. Mr. Talbot draws attention to the greater fatality of disease amongst poor children, which he ascribes to 'the ignorance of mothers of the merest rudiments of nursing, coupled with strong prejudices against baths and fresh air'. In view of the prevalence from zymotic disease, shown in the figures given above, it is inexplicable to us that the Board of Works should, against the advice of their officers, have declined to open the infectious hospital which they have recently established at West Ham. We would suggest to Messrs. Corner and Talbot the desirability of their statistics being on an uniform plan.

ST. MARY, NEWINGTON.—Dr. Iliff's report for 1878 is somewhat late in appearance, through its publication as one of the appendices to the Annual Report of the Vestry, which apparently takes a vast time to prepare. There is not much to chronicle in the report proper, but annexed to it is a valuable and exhaustive defence of vaccination as a prophylactic against small-pox. The pages relating to this subject have since been published in pamphlet form, and it will require much effort on the part of the anti-vaccinators to discredit them. It would be well if Medical Officers of Health generally were to take as much pains in diffusing a right knowledge about vaccination as Dr. Iliff has done. At present the populace is left, in the absence of the real facts on the subject, to the strong assertions of the anti-vaccinators, with the results to which every vaccination officer can testify. In St. Mary Newington there were, in 1878, a total of 2,662 deaths, the highest number for many years. The death-rate was 28.32 per 1,000 of the estimated population. The infantile mortality was high, no less than 721 dying under one year of age, and 1,220 under five years. Zymotic diseases caused in all 586 deaths; but nothing whatever is said as to the circumstances of the prevalence of the several diseases. Dr. Iliff devotes some attention to the discordant opinions of Drs. Frankland and Tidy as to the London water-supply, and states that he himself still believes 'that if increased care be taken to prevent the pollution of the Thames above the intake, if a larger extent of subsiding reservoirs be provided, and if the filtration be rendered more effectual and not hurried, we have in the Thames water a potable fluid which in constitution and taste is admirably fitted for drinking, and superior to that to be obtained from most of the other suggested sources'.

STALYBRIDGE.—The last report for this district is for the year ended March 20, 1880. Why this irrational and unscientific method of calculation has been adopted does not appear; and Mr. Roberts-Dudley must see that the statistics which he gives of other towns are not strictly comparable with those of Stalybridge. The report, which consists exclusively of statistics, gives for Stalybridge an annual death-rate of 20.97 per 1000, a considerable improvement on that for 1878. Out of a total of 491 deaths, 45 arose from zymotic diseases. Mr. Dudley reports 'a decided improvement in the rate of infant mortality', though the deaths of 118 children under one year of age out of a total of 491 can hardly be considered satisfactory.

WALKER-ON-TYNE.—The great sanitary difficulty in this district would seem to be the emptying of refuse and excrement receptacles. There are no local bye-laws for enforcing their periodical cleansing; and thus they very often become most offensive and injurious to health. It is true that the Local Board have submitted a code of bye-laws for the approval of the Central Board, but they have not consulted Mr. Hurst about them—a significant commentary on the authority's general sanitary administration. Walker was fortunate in escaping a high death-rate last year, though there was a great amount of sickness and privation. The total number of deaths from zymotic diseases is not stated, but six occurred from scarlatina, against 37 in 1878; and none from typhoid, against 8 in 1878. There were altogether 347 births and 139 deaths last year; equal to rates of 43.3 and 17.3 per 1,000.

WATFORD.—Dr. Brett records for this district birth and death-rates equal to 34.4 and 19.3 per

1,000 of the estimated population. Fourteen deaths occurred from the principal zymotic diseases, against 27 in the previous year. Of the 193 persons dying, 37 were under one year, and 82 had reached the age of 60 years and upwards. Amongst sanitary matters needing the early attention of the Authority, are the provision of a constant water-supply and the outfall of sewage into the river, the more effectual ventilation of the sewers, and the abolition of the numerous cottages which are unfit for human habitation in the courts and alleys of the town.

WEST BROMWICH.—Mr. Manley's report is too brief for an extensive and populous district of 53,000 ersons. He records for 1879 a total of 2,285 births and 1,251 deaths, equal to rates of 42.6 and 23.3 per 1,000 against rates of 44.9 and 23.0 in 1878. The presence of an epidemic of scarlet fever in the first quarter of the year, the very severe weather, and the privations from bad trade, are stated to have assisted in this increase. The number of deaths amongst children under one year was 669, or considerably more than half the total mortality. How Mr. Manley can reconcile this terrible proportion with his observation that the rate of infantile mortality 'being taken as a test of sanitary condition more than the general death-rate, the result is with our surroundings satisfactory', passes our comprehension. The total number of deaths from zymotic diseases was 223, against 269 in 1878, and an average for five years of 184. The high zymotic death-rate (4.1 per 1,000) is stated to be entirely owing to epidemics of scarlatina and whooping-cough in the earlier months of the year. The number of deaths from each zymotic disease is not, however, given; nor are any tables appended. From a list given of desiderata for the town, it would seem that West Bromwich is very behind-hand, from a sanitary point of view. There is no hospital, mortuary, or disinfecting apparatus; public drainage is yet under consideration, 'the provision of pure water is needed', and buildings are still allowed to be built on insanitary sites.

YORK RURAL.—The details of sanitary work given in this report show Mr. Marshall to be fully alive to his duties, and to the importance of taking measures with regard to infectious disease immediately on its first appearance. He records for the year 1879 a death-rate of 17.02 per 1,000, as against 17.5, 13.9, and 15.2 in the three previous years. Scarlatina was the most serious disease, having been epidemic, more or less, for the last five years. Doubtless the proximity of the district to the City of York favours very considerably the importation of infectious disease into it. Altogether, 40 deaths were registered from zymotic disease, scarlatina being responsible for 11 and diarrhœa for 13. The absence of any tabular statements is to be regretted.

COMBINED DISTRICTS.

DONCASTER, GOOLE, SELBY, and TADCASTER.—The combined district in these unions, held by Dr. J. Mitchell Wilson, was only formed in the autumn of 1879, and it is, therefore, as yet too early to express an opinion on its practical working. Some part of it, however, had for five years and a half previously, formed a combined district under the charge of Dr. Franklin Parsons, now of the Local Government Board. On the appointment of that gentleman to Whitehall, an enlargement of the combination (which had previously comprised the Goole and Selby Urban and Rural Authorities), was effected by the Local Government Inspector for Yorkshire, so that the district now comprises the Doncaster, Goole, Selby, and Tadcaster Rural Districts, and the Goole, Selby, and Tickhill Urban Districts. The defect to which we have often alluded occurs in this combination also, viz., sanitary jurisdictions locally included within the area of the combination, and intimately bound up with it in associations, are allowed to have separate officers of health. Thus, the Doncaster, Mexborough, and Askern Urban Authorities are not included in the combination, though the latter Authority has a population of only 457 persons living in an area of 849 acres. Dr. Wilson's salary is £560 per annum (Dr. Parson's salary was £500), and he has to devote his whole time to the duties of the office. The estimated population of the district is 83,353, and the area is 284,498 acres. Geographically, the district does not seem the most compact that could be devised, for the Doncaster district is separated from the others, and the Thorne district, which would seem preferable to Doncaster for inclusion in this combination, is left out. Doubtless, however, the combination has, as elsewhere, been formed out of materials which were most readily available, and not out of those that were theoretically the most desirable. As Dr. Wilson only entered upon his duties in October 1879, his acquaintance with the district at the date of reporting was of necessity an imperfect one. But he seems to have already taken energetic action with regard to the water-supply, since, in his opinion, 'in dealing with it some definite and satisfactory improvement in the public health can be most effectually brought about'. He has, in the present report, endeavoured to give a short statement of the present condition of the district, 'rather than a complete history of its sanitary progress throughout the year'. Doubtless, however, in future reports, so important a feature as the year's history of sanitary work will not be overlooked. The death-rates of the various districts were, on the whole, tolerably satisfactory, with the exception of Goole Rural and Selby Urban, which were 21.0 and 23.7 per 1,000 respectively. No particular reason is assigned for these high rates of mortality, but the sanitary state of both districts is bad. The death-rate from zymotic diseases was, as a rule, high. Scarlatina was prevalent in the majority of the districts, and was especially fatal at Balby, in the Doncaster Rural District, at Goole and at Selby. Several fatal cases of typhoid are reported in connexion with polluted water or imperfect disinfection of excreta. No comparative statistics are given as to the relative mortality from different diseases; nor are any tables added as to the movement of population in the district as a whole. The present report must, however, be regarded as only a preliminary one, and we shall expect to find in the next one much fuller details with regard to many matters of interest in the district.

HALIFAX COMBINATION.—The observations which we felt it necessary to offer on Dr. Britton's Annual Report for 1878 (see No. for July 15, 1879, p. 30), he has thought fit to notice in his report for 1879, and to disclaim, at the same time, for the reports of Officers of Health any such functions of instructiveness as we had assigned to them. Replying to the criticisms that the report did not contain an account of the district as a whole, and that it was of no general interest, Dr. Britton observes, 'I may state that the reports are not prepared for the public generally, nor do the Sanitary Authorities wish them

to be so; but that they contain matters of local interest only, and are useful for the purpose for which they are intended'. After remarking that combined districts cannot be dealt with as a whole, for they rarely contain a whole district, but are made up of disjointed districts with little or nothing in common, Dr. Britton goes on, 'Reports, to be valuable, must be of local interest mainly, as showing the advances in sanitation to those who from their local knowledge can see the benefits to be derived from the improvements effected; and the more interesting, and, consequently, the more valuable they are to the localities to which they relate, the less of interest are they to those living at a distance, and to the public generally.' This estimate by Dr. Britton of the usefulness of a Medical Officer's Report is so singular and uncommon that we think it best to leave it without criticism. Our views on the subject have already been expressed in our notice of the report for 1878; and we hardly think that Dr. Britton's arguments have successfully assailed our position. Be that as it may, the facts for which one is accustomed to look in reports on combined districts can, in the report before us, be only got by laborious comparison of the reports on individual districts. The death-rate of the whole district is not given, nor is the total number of deaths from each zymotic disease stated. It would appear, however, that the death-rates of the various districts showed the usual startling fluctuations that are observed when calculations are made from very small figures. Thus, 68 deaths gave to Hipperholme a death-rate of 22.5 per 1,000, and 41 deaths to Luddenden Foot, a death-rate of 12.6—the highest and lowest in the combination. Scarlatina was prevalent in many districts, though it was generally of a mild type. It was, however, very fatal at Brighouse and Rastrick, principally from the sequelæ. Dr. Britton attributes the fatality partly to the want of ventilation in the new back-to-back houses which are being built, and to the too prevalent habit of overcrowding. Several cases of enteric fever are reported in association with gross sanitary defects. Whooping-cough was very fatal in several places, and there was an epidemic of measles at Elland. The suffering and mortality from lung diseases, such as bronchitis, pneumonia, and consumption, were very large, the cold, damp, and cheerless weather having had a serious effect upon those with weakly lungs. A large number of deaths from heart disease was also recorded, due, Dr. Britton thinks, to the hard times and commercial depression, with their consequent anxiety to householders. The proportion of uncertified deaths is very large, amounting in 4 out of 17 districts to more than 12 per cent., and in 1 to 20 per cent. of the total deaths. During the year Dr. Britton analysed 68 samples of water, and continued his investigations into the water-supply of the various districts. It is as unusual as it is satisfactory to find that in his efforts for sanitary improvement, the Medical Officer of Health has been 'ably seconded by the owners of property'.

William Emerson Baker offers $200,000 to the Public Health Association of Boston, on condition that half as much more be contributed by others. The association is devoted to investigation as to house ventilation and drainage, the sale of adulterated and otherwise unfit food, and general questions concerning health.

LAW REPORTS.

DOMESTIC WATER-SUPPLY.

At the Mansion House, Mr. John Lynn, the proprietor of oyster rooms at No. 70, Fleet Street, appeared before Alderman Sir W. Rose, to answer a complaint preferred against him by the Commissioners of Sewers of the City of London, under the Sanitary Act of 1874, for having a well upon his premises, the water of which was unfit for public use, and likely to endanger the public health. The case for the complainants was that the well in question was used by the public frequenting the defendant's shop, and that water obtained from it was in such a polluted condition as to render it highly dangerous to health, and likely to engender typhoid fever and other dangerous diseases. The defendant entered into a written agreement in September last that the pump should not be used for domestic or drinking purposes, and that the pump should be fastened by a chain during the hours the defendant was licensed to carry on business, but this undertaking appeared to have been entirely disregarded, and the Commissioners were consequently compelled to institute the present proceedings in order to have the well entirely closed.—The evidence of Dr. Sedgwick Saunders was to the effect that the water of the well was most dangerously polluted with sewage and other refuse.—The defendant, in reply to the charge, said that a notice was affixed to the pump, and he assured the Alderman the water had not been drunk or used for cooking purposes since he had received the notice. He promised that the pump should be entirely closed.—The Alderman made a formal order that the pump should be closed forthwith.

DISUSED BURIAL GROUNDS.

The Queen v. *Jacobson.*

This was a prosecution for having unlawfully caused certain graves in the old burial-grounds attached to Whitfield Chapel, in Tottenham Court Road, to be dug open, and removed therefrom a large quantity of human remains there interred, 'to the great scandal and disgrace of religion, decency, and morality'. The indictment had been laid in the Central Criminal Court, and had been removed into the Queen's Bench Division of the High Court of Justice by *certiorari* for the purpose of trial, and it had been tried before the late Lord Chief Justice. At the trial it appeared that the ground, though never consecrated, had been used for interments from 1756 to 1853, when it was closed as a burial-ground by Order in Couucil. In 1862 the defendant bought a portion of the ground for building purposes, and the portion which he purchased had been used for interment by the families of those who had purchased the right of interment. The defendant had proceeded to excavate the ground for purposes of building, and it appeared that pieces of coffins were turned up along with human bones. A person whose relations had been buried at the spot gave evidence, and in the result the jury found that human bones, forming parts of distinct bodies, had been disinterred, but not improperly or indecently. Upon these findings the late Lord Chief Justice thereupon reserved his judgment; but a verdict of 'Guilty' was directed. The defendant recenlly came up for judgment before Mr. Justice Field and Mr. Justice Manisty, when Mr. Justice Field fined him £25. Mr. Justice Manisty desired that it should be understood that there was no doubt as to the law.

In his view the freeholder was bound, when he originally disposed of the land for a burial-ground, to see that it was preserved for the purpose of interments, and that the bodies should not be disturbed; and that each owner in succession took it under the same obligation.

THE SALE OF GAME.

At the Lambeth Police Court, Mr. Jarvis, a shopkeeper, appeared to an adjourned summons taken out by Inspector Stevenson, on behalf of the Vestry of St. Giles's Camberwell, for exposing for sale and depositing in a place for the purpose of sale, a quantity of rabbits, the same being unsound, unwholesome, and unfit for food.

Mr. Chance, on the case being called on, said he had received a written statement from Dr. Bristowe, the Medical Officer of Health, in which he said the question as to the difference between the effect on the system of rabbits putrid and hares high, or, to put the matter more broadly, why certain meats should be regarded as wholesome when undergoing decomposition, and certain others should be regarded as unwholesome when in that state, was, no doubt, a difficulty. But there is a real and practical difference recognised by the public, and admitted by scientific men, between the effects of partially decomposed white meats and the flesh of tame animals on the one hand, and those of the flesh of wild animals on the other. Fowls, tame ducks, veal, pork, beef, and perhaps mutton, are all offensive and unwholesome when high; wild ducks and other wild birds, hares and venison on the other hand, were for the most part fairly wholesome when in this condition. The stages of decomposition, its rapidity and other attendant circumstances, exerted an important influence over the wholesomeness of animal food, as meats allowed to become dry and undergo slow changes remained fit for food for some time after decomposition had set in, but those which were permitted to decompose rapidly, and especially to decompose under the influence of heat and moisture, and in which, therefore, poisonous gases were given off abundantly, soon became putrid and utterly unfit for food. Flesh habitually eaten high, like game, was always allowed to desiccate, and even that, if allowed to putrify under the influence of heat and moisture, became uneatable. He (Mr. Chance) said he had adjourned the case in order to have this information, which would be of benefit to the public. He was satisfied the prisoner had committed the offence for which he had been summoned, and ordered him to pay a fine of £3 and £2 7s. 8d. costs.

WATER-SUPPLY FOR BATHS.

The Sheffield Waterworks Company v. *Bingham.*

This case raised a question on the construction of the Sheffield Waterworks Act, 1853, as to the right of the proprietors to charge an additional sum over and above their ordinary rates in respect of the use in a private house of a bath. By section 79 of their Act, the company are required to furnish a sufficient supply of water to every inhabitant occupying a private dwelling-house in the town of Sheffield, at certain progressive rates, according to rental. By the 81st section, 'in cases of schools, manufactories, dyers, printers, bleachers, brewers, innkeepers, livery stable-keepers, alehouse-keepers, or persons requiring a supply of water for baths, ponds or pools, or closets, or for washing carriages, or for cows or horses, or for the purpose of any trade or business whatsoever, such supply shall be furnished by the company in such cases at and after' certain specified rates per thousand gallons, with a proviso that in the case of stables, or premises in which horses or carriages are occupied with any private dwelling-house, the water-rate shall, if desired by the occupier, be assessed upon the amount of rent of the private house, including the rent of the stable, and in such cases the company were not to take the additional charges therein before specified. It appeared that the company, finding it inconvenient to use a meter for every private bath, had arranged a composition of 30s. a year for houses over £100 per annum in respect of one bath. The defendant occupies a house rented at £140, and has a fixed bath in his house, used by the members of his family, and he had up to June 1878 paid the company the above composition in respect of his bath. Since 1878 the defendant has declined to pay the company anything in respect of the bath, contending that, according to the construction of their statutes, they were not entitled to any extra payment in respect thereof. The company now brought this action to determine their rights under the statutes. The matter has caused some considerable interest in Sheffield, and a 'Sheffield Water Consumers' Defence Association has been formed for the purpose of resisting the plaintiffs' claim in the action. The plaintiffs asked for a declaration that the defendant was liable to pay for the water consumed in his bath according to the rate fixed by section 81, and they contended that the rates fixed by that section were to be paid in addition to those in section 79. The defendant contended that the word 'bath' in that section applied only to baths used for some public purpose, where large quantities of water would be consumed, and not to baths for domestic use. All water for domestic purposes, including the use of a bath, it was submitted, would be paid for under the 79th section.

The Master of the Rolls said he must construe the words in the 81st section according to their ordinary meaning, as there was no context to explain such meaning away, and, notwithstanding the fact that no doubt such construction, if carried to its ultimate conclusion, might in some instances, as pointed out by the defendant's counsel, lead to certain absurdities, in his opinion, section 79 of the Act compelled the company to supply water for domestic purposes, and if there had been no other section he should have held that such purposes would include the use of water for a bath. By the 81st section, however, the company were entitled to make certain other charges in some cases in substitution for those mentioned in the 79th section, and in other cases in addition to these charges. The later words of the section, after mentioning the various trades, must in his opinion apply to persons who did not carry on any business, and therefore to the defendant in this case. That being so, the word 'bath' was mentioned as one of the cases in which the company might make an additional charge. There was no ambiguity as to the meaning of the word, and therefore, in every case where more than 1000 gallons was used for the purpose of a bath, the company were entitled to make the extra charges mentioned in the 81st section. There was no doubt a difficulty in measuring the quantity consumed; but, after all that was by no means insuperable, and could be ascertained approximately even without the use of a meter. His lordship therefore made the declaration asked for, and gave the plaintiffs the costs of the action.

THE ABATEMENT OF NUISANCES.

In this case Mr. Basford, the agent for certain property in Derby, appealed against three orders of the Justices of the town, the orders being for the abatement of certain nuisances, and requiring some structural alteration.

Mr. Lumley, for the respondents, first drew the attention of the Recorder to the clauses of the Public Health Act.

Mr. Smith, for the appellant, contended that the Council had proceeded under the wrong Act. They ought to have proceeded under the Derby Improvement Act of 1879. Under this they had special powers, and this being so he submitted they would not proceed under the general powers of the Public Health Act. Mr. Lumley submitted that the private Act would not supersede all the machinery of the public Act.

After a long discussion it was decided that the facts of the case should be heard.

Arthur Clark, sanitary inspector of Derby, had known the property two-and-a-half years, and during that time had visited it repeatedly. In some of the houses there was no back ventilation, and in others there was the 'tumbler' closet system. In that system the flushing was far from perfect. It would be regulated to flush twice a day, or twice a week, and at the rate he had seen it dropping would not be flushed more than once a week. He was of opinion that these closets were a nuisance and injurious to health. They smelled very badly. His remedy was the construction of water-closets. Witness brought the matter before the Committee, and a Sub-Committee viewed the premises; in consequence of a resolution of the Committee, he caused three notices of abatement to be served on Mr. Basford. Those notices were disregarded. On November 3rd, the borough magistrates heard the case, and made three orders for abatement. The owner of three of the houses had put in pan closets, and they had worked perfectly well.

Mr. W. Iliffe, Medical Officer of Health, knew the property, and said the privies were in too close proximity to the houses. They were a nuisance, and injurious to health. The tumblers were badly constructed, and they were so close to the houses as to be a positive nuisance. Tumblers were not so good as separate closets, but if properly seen after he had no objection to them. If properly constructed, and with a proper flush of water, tumblers were efficient.

Mr. Wm. Willott Popplewell, architect and surveyor, stated that he was surveyor to the Litchurch Local Board for four years. He had had considerable experience of cottage property. There was nothing better than ashpits if properly constructed, and at a sufficient distance from the houses. Water-closets had been put up in Litchurch while he was there, but they were not successful. He should say the tumbler-closets in question were no nuisance if properly looked after by the tenants. The privies were tolerably sweet when he examined them three weeks ago. He did not think it would be an improvement to turn them into separate water-closets, because they were so liable to get out of repair, and the tenants ill-used them. The privy system was not a suitable one for a crowded neighbourhood. The benefits of the tumbler system depended on the supply of water.

Councillor T. L. Ryley, builder and surveyor, who had had considerable experience in drains, etc., said he had frequently had to turn water-closets back to covered cesspools and tub-closets, because the water-closets were continually out of repair. Tumbler-closets depended on the supply of water. Water-closets were good things, but in cottage property people would not use them properly. There was no reason why the tumblers should not be used properly. Joseph Brown, who had been agent for cottage property, stated that in 1877 sixteen water-closets were turned into tub-closets by order of the Sanitary Authority. This had happened in other instances, and the Authority had not seemed to quite make up their mind which was the right thing.

The Recorder said he had no hesitation in dismissing the appeal. The Authorities would be wanting in their duty had they failed to take the matter up. He could not overlook the evidence of the medical men.

After some discussion as to costs, the Recorder decided that the appellant must pay them.

BRIEF NOTES OF USEFUL CASES.

SEWERAGE WORKS.

1880. *Bolton Mayor* v. *Bolton Guardians.* Action to restrain defendants from constructing sewerage works outside their own district, and within the district of the plaintiff's, without, it was alleged, having given the requisite notices to the occupiers, and without the consent of the Local Government Board —Compromise suggested by the V.C. and agreed to. (*Times* January 23, 1880.)

DRAIN.

1879. *Bowes* v. *Watson.* "Land Drainage Act, 1847," 10 & 11 Vict. c. 38, ss. 14-5.—The words "drain, stream, or water-course" include an underground drain, and are not necessarily limited to an open drain. (42 L.T., 27; 44 J.P., 364.)

ORNAMENTAL GROUNDS.

1880. *Faithfull* v. *Appleyard.* Ornamental trees in a London "Square" overgrown so as to impede access of light to houses—Trees managed by a committee of householders who had ordered them to be lopped—Motion for an Injunction to restrain further lopping refused, it being shown that the action of the committee had in all cases been reasonable, and that there seemed no likelihood that they would do more than remove such superfluous branches as interfered with the convenient enjoyment of the Square by the inhabitants generally. (*Times*, May 4, 1880.)

HIGHWAY OBSTRUCTIONS.

1880. *Fritz* v. *Hobson.* Public nuisance by obstruction of highway by building materials—Interference with access to house—Loss of custom in trade —Held that on proof of the fact of excessive obstruction, plaintiff was entitled to damages in respect of the time during which the wrong continued. (49 L.J., Ch., 321; L.R. 14 Ch., 542; 42 L.T., 225.)

BUILDING LINE.

1880. *Goldstraw* v. *Duckworth.* Local Act prohibiting projections in streets—Oriel window projecting two-and-a-half feet, but fourteen feet above the ground, held not to contravene the Act, as such a window could not inconvenience foot-passengers. (49 L.J., Q.B., 73; L.R. 5 Q.B.D., 275; 42 L.T., 441; 44 J.P., 410.)

RATES.

1875. *Leicester Water-works Co.* v. *Cropstone Overseers.* Disputed Assessment—Reference to arbitration—Refusal of losing party to be bound—Wh

upon the Court interfered. (44 L.J., M.C., 92; 32 L.T., 567 and 752; 40 J.P., 165.)

HIGHWAY.

1880. *London Corporation* v. *Riggs*. A "way of necessity" is not a general right of way for all purposes to or from the enclosed land, but only a right of way so far as might be necessary for the enjoyment of the enclosed land in the state in which it happened to be when the right arose—Owner of a limited right of access to agricultural land not entitled to access to the same land in order to use it as building land. (49 L.J., Ch., 297; L.R., 13 Ch. D., 798; 42 L.T. 580; 44 J.P., 345.)

RATES.

1852. *London and North-Western Railway Co.* v. *Bedford*. Appeal against an Assessment—Arbitration—Award adverse to Parish, which thereupon acting in bad faith, sought to repudiate the award—Distress—Rule absolute to stay all proceedings in Replevin. (17 Q.B., 978; 18 L.T., (o.s.), 256.)

SEWER.

1880. *Metrop. B. W.* v. *London and North-Western Railway Co.* "Metropolis Management Act, 1862," 25 & 26 Vict. c. 102, s. 61.—Houses outside the jurisdiction of a Board allowed to use the sewers of the Board—Held that this privilege did not extend to new buildings erected subsequently, although forming part of the first-named block—Injunction granted. (49 L.J., Ch., 355; L.R., 14 Ch., 521; 42 L.T., 330.)

ELECTION.

1880. *Reg.* v. *Clerk of Bury Guardians*. 7 & 8 Vict. c. 101, s. 15—A Clerk of Guardians sitting to revise a list of voters is not entitled to insist on a claimant appearing in person if he sends a suitable representative or agent. (44 J.P., 216.)

APPORTIONMENT OF PAVING EXPENSES.

1880. *Shanklin L. B.* v. *Miller*. "Public Health Act, 1875," ss. 150 and 257—Expenses apportioned—No appeal—Alleged irregularities which might have avoided the apportionment—Held that the defendant was too late in raising his objections. (49 L.J., C.P., 512; L.R., 5 C.P.D., 272; 42 L.T., 738.)

PAVING EXPENSES.

1879. *Tunbridge Wells L.B.* v. *Ackroyd*. "Public Health Act, 1875," ss. 150, 257, 26—Paving expenses apportioned, and defendant's share paid—Subsequently another owner appealed against the apportionment with the result, *inter alia*, that the arbitrator found the defendant under-charged—On proceeding to compel the defendant to make a supplementary payment of the difference—Held that he was not bound to pay the extra amount, not having been a party to the later proceedings. (49 L.J., Ex. 403; L.R., 5 Ex. D., 199; 42 L.T., 640; 44 J.P., 504.)

APPEALS AGAINST RATES.

1878. *Walsall Overseers* v. *London and North-Western Railway Co.* The Court of Appeal has jurisdiction to entertain an appeal from the Queen's Bench Division, on a Rule to quash an Order as to the validity of a Rate. (48 L.J., M.C., 65; 39 L.T., 453; 43 J.P., 108; L.R., 4 App. Cas., 30.)

ADULTERATION OF FOOD.

1880. *Warren* v. *Phillips*. "Sale of Food Act, 1875," s. 3—Baking Powder held not an article of Food—Therefore, selling powder with alum admixed is not selling an adulterated article of food. (At Q. Sess.) (44 J.P. 61.)

SCAVENGING.

1879. *Williamson* v. *St. Mary, Islington, Vestry*. Contract to remove house-refuse at stated intervals—One condition, a fine for every instance of default, the vestry being sole judges—Such fines to be deducted from contract money—Held that on the evidence the Vestry was entitled to enforce the penalties for breach of contract. (*Times*, June 19th, 1879.)

LEGAL NOTES AND QUERIES.

PIG-KEEPING.

In reference to the keeping of pigs '*in* slaughter-houses' under the Public Health Act, *vide* Model By-laws (No. 7), for regulation of slaughter-houses, I interpret 'slaughter-house' to mean 'buildings and places' used by a slaughterer of animals for sale, and not the single compartment devoted to killing, to the exclusion of the adjoining buildings used in the trade. My opinion is overruled by a local Sanitary Authority. Your opinion on the point will be esteemed.

P. S. H.

[We apprehend that our correspondent is partly right and partly wrong. He is so far right that the word 'slaughter-house' in By-Law 7 means more than the actual apartment where the killing takes place—it means in fact what it is defined to mean in the licence itself, which provides for all the premises *named* and described in the licence being included within the scope of the license. But our correspondent is not entitled to give an extension to the terms of the license which that document does not authorise, and say, as he seems to do, that where a killer is a vendor, all adjacent premises where selling goes on come within the scope of the word 'slaughter-house'. The question is purely one of fact and not of law, and on the facts stated we think the Sanitary Authority are right.—ED.]

OPEN SPACES.

Notice has been given that it is intended to introduce into Parliament, in the ensuing Session, a Bill enabling the Metropolitan Board of Works, and any vestry or other local or parochial authority, and the Corporation of the City of London, to purchase or acquire any open spaces within the limits of the Metropolis, or control over them, devote them to public recreation, and to apply their funds, rates, or revenue for the purpose. Provision will also be made by the Bill for agreeing with owners and others interested in them as to their purchase and acquisition, and for the treatment as open spaces of disused churchyards, burial grounds, and cemeteries, subject to the ecclesiastical sanction provided by the Bill.

BRANCH SEWERS.

In the parish of W—— the local authority has laid down a system of sewers through the main roads. In some of the branch roads which have not been sewered, houses are being built, the owners of which have applied to the authority for permission to run a branch sewer down to the main for the drainage of their houses, and leave has been given. Houses have since been built in the same road by other owners. If each owner is allowed to run a separate branch to the main, the road will soon be burrowed with pipes, and this continual breaking up of the road throws an extra expense on the highway authority. Please inform me whether a branch sewer connecting two or more houses, put in at the expense of the owner, on entering the highway does

not become the property of the local authority, with power to connect other houses with it (without compensation), instead of running several branch sewers parallel to each other down to the main. Should any of these branch sewers become choked, or the pipes broken in the road, I expect the owners would look to the authority to put it in repair.

SURVEYOR.

[This is clearly a case in which the local authority should take into its own hands the question of branch sewers. A private individual who constructs a sewer along a highway does not, we think, retain a perpetual right to treat such sewer as his own private property.—ED.]

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE DISPOSAL OF TOWN SEWAGE.

The case of the town of S——, cited by a correspondent in the December number of the SANITARY RECORD, and in regard to which suggestions are invited, is apparently a peculiar one, inasmuch as four engineers are stated to have reported thereon already. Although not so stated, it seems as if none of the four have been successful in solving what is ordinarily a problem of no great intricacy—the disposal of the sewage of a town situated on a hill-side, and having presumably a fair amount of agricultural land below it. The particulars given do not, however, include any definite information on this latter point, neither is any idea given as to the population and area to be provided for, the dry and wet weather flow of sewage, and the elevation of the existing tanks above land (if any) suitable for one or other of the different land systems of sewage treatment. It is impossible to offer any advice in the face of such an absence of information, and in any case it could hardly be expected that advice so obtained would be of much value unless given after a personal inspection of the town and district by a competent authority. It is evident, however, that 'someone has blundered' in the past, in not having foreseen the inevitable increase of river pollution which would be produced by the execution of the sewage scheme referred to. It has long been known that 'tanks' alone fail to effect any real improvement in the constitution of sewage. Consequently, any measures which the authorities of S—— may adopt will have to be upon a much more comprehensive basis than this, their precise nature depending upon local circumstances, such as those above defined.

Surely the advice of one engineer, of sufficient experience and authority, would have been less confusing than separate reports from four different quarters?

JOHN S. HODGSON.

ZYMOTIC DISEASES.

I feel much obliged by your courteous criticism on my remarks on 'Autumnal Diarrhœa', in connection with zymotic disease, published under the head of 'Correspondence' in last month's issue of the SANITARY RECORD. I am fully aware of the difficulties attending the arrangement for a more clear definition and nosological arrangement of cases reported as diarrhœa occurring in autumn. I only mildly suggest that all cases reported in autumn as diarrhœa are not of the nature of 'autumnal diarrhœa', or zymotic in origin, course, or consequence. I would suggest that, as deaths from diarrhœa occurring in autumn are apparently looked upon as suspicious, more careful attention should be given by those requiring certificates of cause of death as to description of diarrhœa, whether it be zymotic, or dependent upon ordinary or extraordinary causes.

A. B. BRABAZON.

12, Darlington Street, Bath,
January 4th, 1880.

SANITARY CONVENIENCES FOR BOTH SEXES.

In the course of a long life I have often had to ask myself the serious question whether I am living in a civilised time and country or not, and the question recurred to me very forcibly on reading the useful article on 'Sanitary Conveniences for Women', which appeared in your last month's issue. As a matter of fact, the amount of accommodation for certain necessary offices of nature is utterly insufficient, is truly disgraceful, and is to be accounted for by the enormous extension of the metropolis within the last fifty years—since the introduction, in fact, of omnibuses and railways, together with the absence of administrative bodies really capable of coping with the difficulties. It is no marvel that Vestries and District Boards have not done more. No one believes them to be in advance of their age. If any proposition is brought forward that involves a serious expenditure, they either oppose it themselves or they are met by a storm of opposition from local ratepayers, which subsides as soon as it is seen that no serious action will be taken. The parties most to blame are our medical men, who should have appealed in a body before this to the legislature, that compulsory powers might be given to the local bodies, and enforced upon them, for the purpose of providing decent accommodation and preventing individual suffering.

I am not prepared to admit that one sex is much better off than the other. In the great parish of St. James's, Westminster, stretching from Wardour Street, Oxford Street, to Marlborough House, and from Oxford Circus to Coventry Street, there are but about six public places provided for the discharge of urine. There is probably accommodation inside many public-houses for those who frequent them, and at the pastry-cook's and dining-rooms there is generally a retiring-room for ladies. Formerly matters were much better as regards the male sex. Public-houses had generally an external urinal, but this has been given up to such an extent that it is seldom seen except in the suburbs. However, the simple point is, what is the remedy? I know, as a fact, that some vestries have striven to deal with the question, but have been completely thwarted by local opposition, or the threat of an application for an injunction to restrain from some wealthy and selfish individual. What is most likely to succeed is that every establishment licensed for the sale of excisable articles shall provide decent internal accommodation as a return for their valuable privileges. A small payment should, I think, be generally required on those seeking accommodation, but not enforced. If this could be carried out, the Local Boards should, I think, be required to see to the salubrity and cleanliness of the precincts. I have often heard that all public-houses are bound to afford accommodation, but that the Act has fallen into disuse.

I have a strong opinion that all the great houses which supply ladies with goods, should provide a ladies' cloak, or retiring, room, and should not shrink

from announcing it. We want a great tradesman to set the example.

Another suggestion is whether our public squares may not be utilised to some extent. This is done in the case of Leicester Square. In our parks, and in such places as Kew Gardens, the Crystal Palace, etc., accommodation is provided, without anything objectionable, so far as I know. We may be sure we are not far from the time when our squares will become public property, to be used and maintained for the benefit of the community, and not of a small number of people who care little about them, and seldom use them. It is as easy to provide decent accommodation in such places as at Kew Gardens. There must necessarily be an officer in the square, that public order and decency may be maintained, and perhaps a woman, who might have the privilege of a stall or hut, and be otherwise useful.

I sincerely hope that medical men will come forward and take up the subject. They are the only people who can do it effectually.

FREDERICK EDWARDS, jun.

Ravenstower, Ravenscourt Park, W.,
January 2nd, 1881.

CARFERAL.

As proprietors of the carferal patents, we have to protest against Mr. Bischof's attack on carferal, published in the SANITARY RECORD of November 15th, on page 165, and to request that you will allow us to reply as briefly as possible to his mis-statements.

We can readily understand Mr. Bischof's disappointment at finding that carferal is superseding his spongy iron, and do not propose to enter into any discussion with him in your columns respecting its superiority, being quite satisfied to leave this question to be decided by the various filter makers who are practically interested in obtaining the cheapest and most efficient filtering material; but merely desire to expose the baselessness of the assumption on which he presumes to attack carferal, and to direct your readers' attention to the erroneous statement on the strength of which he insinuates that the lives of British soldiers are being endangered.

By his own admission, Mr. Bischof is ignorant of the real constituents of carferal, and makes a statement respecting coke, which he says he must *suppose* to be present in carferal, and then proceeds to argue on this supposition. To this we have to reply that *coke* is not a constituent of carferal, and therefore it would be a mere waste of your space to refer any further to the conclusions he deduces from his erroneous premises. If Mr. Bischof does not know what carferal really is, we can only advise him to find out before he again attacks it.

The charge that Mr. Bischof virtually brings against the Army Medical Authorities is a far more serious matter. He states that 'the military gentleman, to whom reference has been made, finding his old filters condemned in the *Nineteenth Army Medical Report*, already referred to, had only to invent a new filtering material named carferal to be at once reinstated as purveyor to the army and navy. Should, therefore, anywhere a similar outbreak take place to the one in Fort George, the health and lives of British soldiers must, without any necessity, be experimented upon to determine whether or not carferal will check the disease as efficiently as spongy iron.' The evident animus of the insinuation conveyed in this paragraph prevents our supposing that Mr. Bischof has made an accidental mistake in stating that carferal was invented by the military gentleman referred to. As a matter of fact, carferal was *not* invented by any military or naval man, but discovered and patented by two gentlemen having no connection whatever with any of the services. It has certainly been adopted by the military gentleman so pointedly referred to, and is now used in his well-known filters; but this is a very different matter to the allegation that he had only to invent a new filtering material to be at once reinstated as purveyor to the army and navy, etc., as doubtless Mr. Bischof himself would admit had spongy iron been adopted in place of carferal. Whether the Army and Navy Medical Authorities will deem Mr. Bischof's insinuations worthy of notice or not we cannot say; but should they do so we have no doubt they will be able to give ample reasons for the preference shown by them to carferal over spongy iron.

THE CARFERAL CO.

147, Queen Victoria Street, London, E.C.
December 14th, 1880.

FOG AND DRAINAGE.

Few localities are free from fog at certain seasons, and we all are aware that the better the drainage the less the fog. I am glad to see this view taken up by engineers in reference to the lessening the density of fog in the Metropolis, for, although the consumption of smoke on Dr. Carpenter's principle would create an improvement, it does not strike the root of the evil. All damp and low-lying localities should receive scientific attention at the hands of the scientific drainer; the more air passing through the sewers the drier will the surrounding earth become. Hence the necessity to increase the inlets, at the same time making it compulsory that every house connecting with the sewer should have its free upright shaft. The currents aloft would not only tend to lift the smoke, but lessen the general density of the lower atmosphere, as, also, the disease and mortality of the Metropolis. M.R.C.S.

OPEN SPACES.

A principle of great public interest and importance is involved in a project which the Great Eastern Railway Company are about to bring before Parliament, for the appropiation of seventy acres of Epping Forest; and against the carrying out of this project I beg you will allow me—as one of the little band of those who, during the past ten years, have assiduously laboured to preserve open spaces in and around the Metropolis—to record an earnest and emphatic protest.

At the present moment free and convenient access to the magnificent recreation ground, which has been secured for the inhabitants of London at so great an expenditure of time, energy, and money, is obtained by two branches of the Great Eastern Railway—the one running from London to Chingford along the north-western side of the Forest, with stations at Wood Street and Hale End; the other running along its southern side, from London to Ongar, with stations at Woodford, Buckhurst Hill, Loughton, Chigwell, Theydon Bois, and Epping. It is now proposed by the Great Eastern Railway Company, on the transparent plea of 'public necessity', to absorb seventy acres of the Forest for an extension of the Chingford line to High Beech, in order to 'open up' the most retired and beautiful part of this fine woodland, notwithstanding the fact that from Lough-

ton, on the southern side, to High Beech, on the opposite side of the Forest, the distance is only two miles, and that the whole of this splendid recreation ground is in reality easily accessible to the pedestrian from the numerous railway stations which at present lie around it.

The Corporation of London, whom Parliament has made the custodians of Epping Forest for the metropolitan public, though not inclined to concede the entire demand made by the Railway Company, appear to favour the project to the extent of allowing the appropriation, for the projected line, of a considerable portion of forest land. I trust, however, that Parliament will resolutely refuse to permit the appropriation of a single acre of a woodland so precious to the population of London. It is not on æsthetic grounds alone that I urge my plea, although these are worthy of more consideration than they ordinarily secure in this too-practical age; but on the ground that the proposed railway would—besides irretrievably destroying and disfiguring some of the most beautiful portions of Epping Forest—destroy the greatest charm of its choicest recesses, their comparative seclusion and remoteness from the hideous accompaniments of a modern railway—a charm which it has been the greatest object of its oldest defenders to retain and perpetuate.

FRANCIS GEORGE HEATH.

Brunswick Lodge, South Hackney.
January 1st, 1881.

SANITARY INSPECTION IN RURAL DISTRICTS.

I, also, was present at the Sanitary Congress at Exeter, when 'some remarks were made with regard to sanitary inspectors not altogether favourable to that body', as stated by your correspondent 'Sanitary Inspector'. Having been an Inspector for some years, I felt that the censure cast upon that body was more severe than they deserve. I am far from believing that the average of us perform the duties allotted to us to perfection, for the reasons given, among others, by your correspondent; small salaries, the election of men of no experience, relations or personal friends of some influential person on the Sanitary Board, and the feeling existing amongst many influential persons in rural districts that the quieter the inspector is the better they think of him. As an instance: some time ago I was speaking with the Chairman of a neighbouring Board of Guardians about a locality that borders on the district I inspect, of the desirability of the two districts combining to carry a sewer through them. I asked if their Inspector had not reported on the same. His answer was, 'No; we do not care about getting any reports from him.' I then said, 'Why do you have him?' His next answer was, 'Oh! we are obliged to appoint him, to keep the Government quiet.' Another instance, in my own district: some time ago I visited a homestead of large extent, and found it in a very unsanitary state. A pump there was, but the water that came from it was exceedingly bad; no good water near; a row of filthy piggeries, close to dairy; owing to pebble pavement being too flat, sewage would not run off the courts or outlets; close at the side of them there was a large stagnant pit, into which the sewage from piggeries, dairy, and yard was occasionally swept, and left for weeks, nay months, to ferment and pollute the surrounding air. I sent a notice to the agent of the property, directing these nuisances to be abated within a certain time. At the next meeting of the Sanitary Board, a letter was read from the owner of the estate, censuring me for interfering with his farm, stating, at the same time, that he thought the duties of a Sanitary Inspector only extended to small cottages and such like, and not to farmhouses. My employers knew better than that, else such a letter, coming from so influential a gentleman as this, would have got me highly censured, if not discharged. I could give you dozens of instances of the same spirit in the actions of those who ought to know better, and assist the poor Inspector, instead of attempting to frustrate him.

From some years' experience, I am fully satisfied that high officials, and many members of Sanitary Boards, know but little of the difficulties that lie in the way of a conscientious Sanitary Inspector doing his duties properly in the rural districts, for several reasons:—

1st. It is a new thing to have sanitary inspection of rural districts, and the Inspector has to explain not only the law on these matters, but has to show the advantage to the people themselves of carrying out sanitary laws in their integrity.

2nd. The Inspector in rural districts is asked, in hundreds of cases, where often it is difficult to get through farm-yards without getting nearly over the shoes with filth and sewage, how it is that now such a storm is made, while it had been in that state for scores of years without any complaint being made of it before, and, as far as they can see, is doing no harm.

3rd. If anything is required to abate the nuisance, it must of necessity cause labour and expense. This is the most difficult part of all to get over, and the Inspector must be prepared often to be reminded of the rates the parties pay to meet his salary, and that the sooner he is discharged from his office the better.

Many other things might be mentioned with which the Inspector has to contend, of which the Sanitary Authorities have no idea at present; after all, however, the work is new, and the present Inspectors are breaking the ground for future and more perfect action. It will be a long time before rural districts take contentedly to sanitary laws; and I, with your correspondent, earnestly hope that some steps may be taken to improve and strengthen the hands of Rural Inspectors, so that their work may be effectual to remove the incalculable amount of nuisances that exist throughout our land.

ANOTHER SANITARY INSPECTOR.

NOTICES OF MEETINGS.

INTERNATIONAL EXHIBITION OF HYGIENE.

On Wednesday, December 29th, at a meeting of the Committee of the Parkes Museum of Hygiene, Mr. Geo. Godwin, F.R.S., in the Chair, a proposal was made to hold an International Exhibition in 1881. After a long discussion, in which Dr. G. V. Poore, Professor Corfield, Mr. E. C. Robins, Mr. Rogers Field, Dr. Gowers, and Mr. Mark H. Judge took part, the following resolution was unanimously passed:—'That Her Majesty's Commissioners of 1851 having expressed to the Committee of the Parkes Museum of Hygiene their willingness to provide a space at South Kensington for an Exhibition of Sanitary Appliances and the Industries connected

with Medicine on the occasion of the International Medical Congress in 1881, it is desirable that the Committee should organise such an Exhibition, provided that a sufficient guarantee fund be obtained.' Those desirous of assisting the Committee in the work they have entered upon, are requested to send their names to the Treasurer of the Museum, Professor Berkeley Hill.

STATISTICAL SOCIETY.

'HOWARD MEDAL.'—The following is the title of the Essay to which the Medal will be awarded in November, 1881. The Essays to be sent in on or before June 30th, 1881. 'On the Jail Fever, from the earliest Black Assize to the last recorded outbreak in recent times.' The Council have decided to grant the sum of £20 to the writer who may gain the 'Howard Medal' in November, 1881. Further particulars or explanations may be obtained from the Assistant Secretary, at the Office of the Society, King's College Entrance, Strand, London, W.C.

NOTES ON EPIDEMICS.

[We propose to give from time to time, under this heading, such facts as we can glean from reports of health officers and from other sources as to the etiology and spread of infectious diseases as observed by local investigators. It is highly important to codify these local experiences, but the task has never yet been attempted. We would venture to express a hope that this column may eventually be found of considerable assistance in this regard, and we earnestly invite all medical officers of health to favour us with their experiences. We shall, moreover, be glad to give space, under this heading to discussions on the causation of epidemics, especially of those diseases the origin of which is still obscure.—ED.]

NOTES ON SUMMER DIARRHŒA.

This complaint, which is commonly designated 'Infantile Summer Diarrhœa', on account of its excessive fatality amongst infants, has been ubiquitous during the summer of 1880. It may be stated as an axiom that all ranks and classes, as well as all ages, are liable to this affection, no matter what their sanitary surroundings, but with careful treatment only the weakly and debilitated, at the extremes of life, die.

Availing myself of your invitation, I venture to supplement Dr. Ashby's important note which is published on page 160 of the October number of the SANITARY RECORD. So far as my local experience enables me to go, the epidemic began here on the 25th July, and terminated rather abruptly on the 16th September. It is true that I had cases of diarrhœa both before and since those dates, but in my own practice the above may be called the 'epidemic dates'. During that time I treated twenty-one adults, namely, one in July, twelve in August, and eight till the 16th September; and fifty-eight children of various ages, namely, to 1st August six, to 31st August twenty-six, and to 16th September twenty-six. Of the seventy-nine under treatment seven died. I think this will be considered a low mortality, as it is only the more serious cases that reach the private practitioner, the rest finding their way to the chemists, who do a large 'diarrhœa trade' in hot summers. Three out of the seven deaths occurred at five, nine, and fourteen weeks respectively, and in all three the diarrhœa was preceded by an 'atrophic' state of system, the common consequence of defective artificial feeding. The other four ranged from eight to nineteen months, two of the four being 'atrophic', and the remaining two were complicated with whooping cough, convulsions, and head symptoms. Thus five out of the seven were decidedly 'atrophic'; one had chronic head symptoms and only *one* could be said to be in fair health at the onset of the attack, which was ushered in with convulsions and aggravated by whooping-cough.

It may be stated without reserve that uncomplicated summer diarrhœa, whether in infants or adults, is quite amenable to treatment, and that the great fatality occurring amongst certain infant populations is invariably accompanied by an 'atrophic' state of system, which in ninety-nine per cent. of the cases has been acquired through defective alimentation, with or without the use of soothing cordials in some form or other. This 'atrophic' state of the system is wholly antagonistic to the best efforts to save the lives of those attacked with epidemic diarrhœa. This experience was gained in the town of Leicester, where 'atrophic' infantile diseases have been remarkably conspicuous during the past quarter of a century. In the years when diarrhœa was conspicuous by its absence, as in 1860, 1862, 1866, and 1879, 'atrophic' diseases were mainly responsible for the persistently high infant mortality in that town. When to this systemic condition has been added the necessary increment of *heat*, the usual diarrhœa epidemic prevailed; the extent and virulence of the epidemic being determined by the number of susceptible subjects in the town. Herein we can discern the importance of a birth-rate uniformly high over a number of years. Leicester alone lost 315 lives, the greater part being infants and very young children, in the nine weeks ending the 9th October, and this fearful epidemic, following on the comparatively low diarrhœa mortality of 1879, only proves that those ill-nourished and ill-favoured very young children who escape in a temperate summer are amongst the deceased of a season such as we have just passed through. Hence the tremendous mortality bill! Now, it speaks volumes for the doctor or the Nottingham mothers (and let me say that the credit is mainly due to the latter) that only seven out of fifty-eight young children were in a condition to resist careful treatment.

Some of the cases just alluded to were interesting both from a sanitary and a medical point of view. A boy of five, whom I attended for head symptoms some months previously, was suddenly and alarmingly seized with vomiting and purging and cramp, which made him scream wildly every few minutes, on the evening of 2nd September. Nothing whatever would remain on his stomach—not even iced champagne—and the stools were little more than coloured water; collapse, accompanied by persistent and violent cramp, threatened the patient with immediate dissolution. At this point I administered chloroform, and kept him completely under its influence for three hours. I left him sleeping, and there was no relapse. At midnight a boy was seized next door but one, and his symptoms yielded to ordinary remedies, as did the majority of the most urgent cases. In none of the cases could I trace any so-called sanitary influence, as they occurred in various localities and amongst different grades of society; sometimes one out of several children, always the weakest; sometimes two, and on one occasion four in one family, were simultaneously prostrated. I don't believe in the contagiousness of the disease, nor do I recognise anything in common with the typhoid state. On the 15th August I was requested by the father to see the corpse of one of his children, a sort of cripple of three years, who had been crawling on the pavement under a broiling sun, and was seized at 3.30 P.M. on

the 14th and died at 11.30 P.M. the same day. The stools, which had been preserved, were distinctly 'rice-water', the abdomen was distended at the time, and the shrunken eyes and general appearance of the body made the cause of death quite evident. This case resembles one of Dr. Ashby's, except that dissolution was, if anything, more rapid, doubtless, in consequence of the antecedent health of the child.

Some, relying on the filth origin of this disease, dogmatise as to treatment. Specific treatment I hold to be but a subterfuge for inability to deal otherwise with the complaint. Specific treatment has been tried at Leicester, and both infants and adults treated with a carbolised mixture. The only specific to which I attach any importance is absolute rest both of body and mind. To treat a case of adult diarrhœa walking about or even sitting erect is just about as impossible as to think of arresting the progress of an infantile case in its mother's arms. Mothers shake their children unconsciously, and this perpetual tremor irritates the child's nervous system beyond endurance, and consequently aggravates the malady. No wonder Dr. Ashby found such a fearful mortality amongst cases carried to hospital. When perfect rest to the nervous system has been secured, the treatment of a case of diarrhœa resolves itself into a very simple process of alimentation and medication, hence my success in the chloroform case. Details as to treatment would not be allowable in a communication like this, even were such admissible in a journal of sanitary science. My chief object in writing is to show that my further experience in Nottingham of this grave disease but confirms the views as to the causation and cure of epidemic infantile diarrhœa, already recorded in the SANITARY RECORD of the 28th March, 15th July, and 15th September, 1879.

Nottingham. ALEXANDER MCCOOK WEIR.

THE CONTAGIOUSNESS OF TYPHOID FEVER.

IN his last annual report on the Homerton Fever Hospital, Dr. Collie makes some observations on the occurrence of enteric fever amongst the nurses at the hospital, which have an important bearing upon the contention that typhoid fever is a contagious disease. Dr. Collie states that believing, as he did at one time, that typhoid fever was not contagious, he thought there must be something wrong with the drains when cases of it arose amongst the nurses. But the considerations which he sets out in his report led him to conclude that the drain hypothesis did not explain the phenomena, and that the cases were, in fact, due to personal contagion, inasmuch as, with one exception, they occurred among persons in direct contact with the enteric sick; whereas persons not in direct contact with the enteric sick, but who were, more or less, exposed to a possible sewer air contamination, escaped. He found further, and in this lies the great importance of his researches, that, in addition to direct contact with the sick, another condition appeared to be no less necessary to the production of the disease—a certain age. Almost all the cases were found to be under thirty, and the majority under twenty-five years old. During the last ten years, though exclusively occupied with fever, Dr. Collie has met with but one case of enteric fever in a nurse over thirty years of age. This element of age is, he believes, the reason of the relative immunity of nurses from enteric fever in certain hospitals, an immunity which might exist always, and everywhere be complete, if due regard were had to the age of those who nurse enteric fever. This immunity would of course prove nothing against Dr. Collie's view that enteric fever is contagious, so long as the nurses have not passed the susceptible age.

SANITARY INVENTIONS.

IMPERMEABLE FLOORS.

IT would be a safe assertion to make of every building in England, that the floors present, to a greater or less degree, open joints, and, as a consequence, are receptacles of dirt. This is owing to their construction, and to the fact that all woods, when worked, are affected by the atmosphere, swelling from damp, and contracting when exposed to dry heat. The first necessity for the satisfactory employment of wood, for any purpose, is that it should be thoroughly seasoned, either by lapse of time, or artificially. In these rapid times the good old system of cutting timber to be used in the form of boards, and stacking it in the open air, but under cover, and there allowing it to remain two years or more, is almost obsolete, and recourse has, therefore, been had to a system of desiccating which, when properly carried out, produces the desired effect in from three to six weeks, according to the nature of the timber. But when all this has been done, and without it the making of a permanently close jointed floor is impossible, there still remains the fact that wood exposed to damp will swell under all circumstances, and contract when the damp is removed, and that the more seasoned the wood is the more rapidly will it absorb moisture. This coming and going of wood, as it is technically termed by wood workers, continues till the timber has become acclimatised, when it will remain in a practically quiescent state. In order to remove the hitherto lasting defect in floors made of any kind of wood, and to provide against the effect of the natural laws of expansion and contraction, a patent has been taken, and the Impermeable Flooring is being manufactured by Howard and Sons of Berners Street, London, with the result that either new or old buildings can have in the future floors made of any woods, either singly or in combination, plain, or elaborately inlaid, which will be permanently close jointed, and as a consequence impermeable and free from dirt receptacles. The desired object is gained by very simple means, and at a cost so low, that there can be no reason for entirely covering floors with perishable carpets, as the outlay for covering an old floor with Impermeable Flooring or parquet, would soon be saved in the reduction of outlay for carpets

By observation and experiment, it is found that if twelve lengths of flooring board, each six inches wide, be planed, they will each shrink transversely with the grain one-sixteenth of an inch, supposing the timber to have been well-seasoned before working, but to a much greater extent if the wood be unseasoned, as is almost always the case in new buildings. Now, as each board shrinks towards its own centre, it follows that on the twelve prepared boards being separately nailed to the joists of a building in the usual way, there will eventually be eleven joints each open one-sixteenth of an inch.

In the patent flooring, the eleven joints are made perfect before the board are laid on the joists, each board being secured to each adjacent one by dog nails stretching over each joint, making one compact

panel, the shrinkage on which will be three-quarters of an inch, presuming the length of each panel so prepared to be six feet, and two are joined together, making a length of twelve feet. The wood is not fastened together at any point, but where the two panels (which are kept in position by rebated fillets) join there will be a shrinkage from each end to that point of three-quarters of an inch. In a room not over fifteen feet wide, this can be allowed to come from under the skirting, so that there will be no opening in the main floor; in rooms of greater width, say twenty-four or thirty feet, there would be an opening of three-quarters of an inch at the end of each 12 or 15 feet panel, provided for by the insertion between each of slips of wood of various widths, which would only require shifting in position, the wider taking the places of the narrow, an operation which in a room 60 feet by 40 could be easily done by a joiner in a day, and as the shrinkage would not take place till the building was thoroughly dry, it follows that the floor would have acclimatised and remain permanently close-jointed as long as the wood lasted.

In new buildings the slips should not be put in till required for occupation, as, if the flooring has been properly seasoned, it will swell from absorption of damp when first laid. When it is required to cover an old floor which has shrunk, the slips are unnecessary, for as there would be presumedly no damp in the building, the Impermeable Flooring, being jointed under hydraulic pressure, will expand slightly in the laying, and very rarely shrink again sufficiently to open the joints.

On recently taking up the floor-boards in the wards of a hospital, immediately under every open joint was a ridge of fine dust from one to two inches deep, which the slightest breath of air put in motion, and between the boards was a similar collection, being gradually carried through each time the floor was washed.

A NEW DRAIN-PIPE JOINT.

We have had the opportunity of being present at the testing of a set of drain-pipes which have been laid with a new form of joint, invented by Mr. Cosmo Innes, of the firm of Innes and Burton, 7, John Street, Adelphi. The following is Mr. Innes's specification with which he has favoured us:—'For each joint, a complete ring of plaited hemp to be served out to the workmen, and treated to a hot composition of pitch, tar, and sulphur, boiled to a consistency satisfactory to the engineers. In laying the pipes, this ring to be slipped on over the spigot end and afterwards driven into the socket with a caulking tool, and the joint to be made good behind the ring with the same composition of pitch, tar, and sulphur, run into the socket hot by means of a clay mould. When all the drain-pipes are laid and jointed as specified, they are to be tested with water-pressure as follows. At the lowest point of the drain in front area, a bend is to be put on with a joint similar to those above specified, and from the bend a few lengths of drain-pipe are to be carried vertically upwards to floor level. The whole of the drains are then to be filled with water and defective joints to be made good till no leakage takes place.' It was to witness this testing with water that we were invited on Christmas Eve. We should first explain that the house is a very large one—No. 6, Grosvenor Square, the residence of the Earl of Home and Douglas—the main drain which runs from back to front of the house being 200 feet long, and receiving on its way numerous branches which drain various small open areas, into which waste-pipes from sinks, etc., are made to discharge. As soon as we had all collected round the vertical pipe rising from the drain in front area, the order was given to turn on the water, and it was allowed to run from all the cisterns in the house. At first it appeared to rise pretty fast in the drains, but when it got near the top of the vertical pipe it rose very slowly, and many were the remarks by the bystanders, that there *must* be a leak somewhere to account for its rising so slowly, which were always met by the foreman drain-layer with the assertion that he *knew* there was no leak, and that the water only rose slowly at the last because it had to fill all the gullies which had a considerable area. This proved to be the case, for when the water did rise to the top and began to run over, and Mr. Innes gave the order to shut all the taps, we all stood by with our watches to time the subsidence of it so as to estimate the size of the leak, but it did not subside at all. We walked through the whole basement of the house, and noted the water standing in each gully, and remarking that it kept exactly the same level without any subsidence at all, we came to the conclusion that the whole system of drains was 'bottle-tight', and that the new joint was a success.

BOYLE'S IMPROVED METHOD OF DRAWING OFF THE PRODUCTS OF COMBUSTION AND HEAT ARISING FROM GAS.

MESSRS. ROBERT BOYLE and SON, the well-known ventilating engineers of Glasgow and London, have added another important invention to the many they have already from time to time brought before the public, and, from the absolute necessity for it, we consider that it should claim the most earnest attention from all desirous of not only preserving their health but also their property. Who that has visited any of our public buildings, such as churches, lecture-halls, theatres, etc., when the gas was lighted, has not, during his stay for some time, and after leaving, experienced a feeling of discomfort and mental and physical irritation, or who has entered a large warehouse or workroom after dark and has not noted the disagreeable state of the atmosphere and the great heat? But, to come nearer home, where is the person who has occupied a sitting-room at night and has not, to a greater or less extent, found the same conditions and experienced the same sensations? These discomforts are all owing to the want of proper ventilation and the means of drawing away the poisonous products of combustion and the heat arising from the gas. Those products not only destroy health and render life miserable, but the sulphurous acid, which is the chief product of consumed gas, slowly but surely destroys everyarticle of furniture and ornament in the apartment, blackening the gilding on the picture-frames, the curtains, carpets, and paint-work, corroding and eating away the polished surfaces of the chairs and tables, and irretrievably ruining the pictures hanging on the walls.

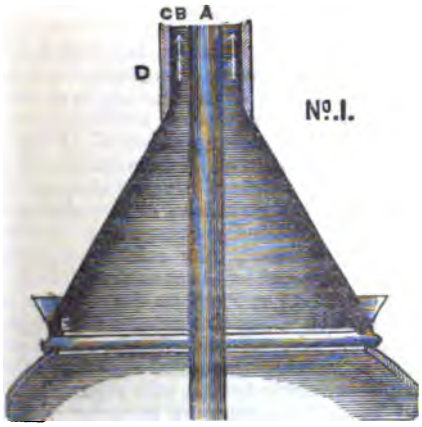
The invention of Messrs. Boyle is intended to obviate all these ill effects, and that, too, in so simple and inexpensive a manner, that it may be applied to every building, great or small; indeed we have no hesitation in saying that, wherever gas is used, this arrangement should be applied as a matter of course; as we build a flue to draw away the smoke from the fire or put in a window to admit light.

The accompanying diagrams show the invention as applied to different forms of gas-fittings, and also

that it can be contrived so as to be an ornament to any room if so desired. This is a very important feature, as the principal objection to all previous arrangements intended for a similar purpose was their unsightliness, and the idea that nothing of the kind could be made in any form that was not open to the same objection.

The idea of using pipes to draw off the products of combustion and heat from gas is, of course, not a new one, but the error lay in single pipes being used, which in practice were found to act as heaters instead of coolers of the atmosphere, as they condensed and radiated the heat exactly on the same principle as hot-water or hot-air pipes used for heating buildings. This was more especially the case where they were applied to billiard-rooms, owing to the amount of piping used; and we know of a number of public buildings where they had to be removed for this reason, the remedy being found to be worse than the evil.

Messrs. Boyle overcome this difficulty by using double pipes, one within the other, with a non-conducting material packed in the space between the pipes. This arrangement not only effectually prevents radiation, but also reduces the condensation in the pipes to a minimum, as the inner pipe is infinitely hotter than the air passing up, as condensation only takes place when a body of a less degree

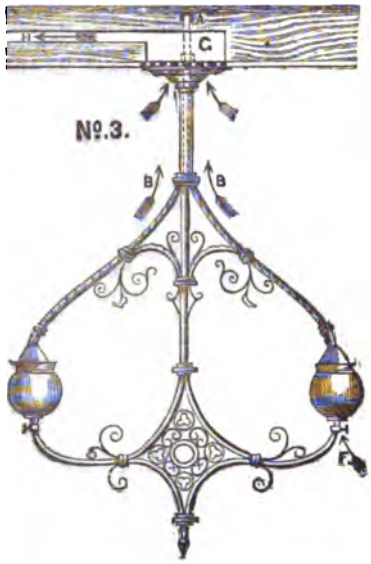


of temperature is come into contact with. Provision, however, is made to receive and dispose of any condensation which may ensue.

Diagram No. 1 shows a section of a hall pendant; A is the gas supply pipe; B 1 in. ventilating pipe for drawing off the heat and products of combustion; C, non-conducting packing between inner and outer pipes; D, 12 in., outer pipe; E, gutter on bottom of cone, above globe, to receive any condensed vapour which may be formed in the pipes. There is no possibility of this gutter ever becoming full and causing an overflow, as the strong and continuous rush of air up the ventilating pipe, created by the air pump ventilator on the top, will cause it to evaporate and carry it off.

Diagram No. 2, hall pendant, showing external appearance.

Diagram No. 3, shows how the principle can be applied in an ornamental form to gaseliers; F, air inlet at bottom of globe to support combustion; G,



foul air chamber above ventilating centre flower; H, ventilating pipe to draw off the heat from the gas, and the vitiated air from the room. This pipe is led between the joists to the wall and continued up to the roof, where it is connected with an air pump ventilator, which creates a powerful upward current, and effectually prevents downdraught.

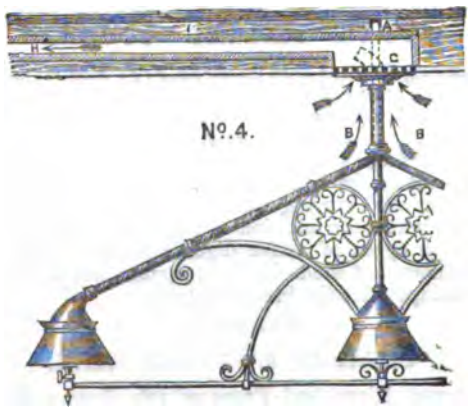
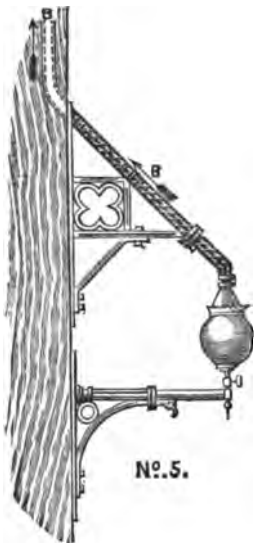


Diagram No. 4 represents the application of the arrangement over the lights of a billiard table. This illustration is specially worthy of attention, as it is in billiard rooms where this invention is most required, and would be found most useful. The ventilating pipe, B, is bent towards and into the mouth of the extracting shaft, so that it acts like a hot blast, and materially assists the ventilation, and double casing with non-conducting packing prevents any chance of fire occurring through the ventilating pipe getting over heated.

Diagram No. 5; bracket light for drawing-rooms and public buildings, showing ventilating pipe led up inside wall to main ventilating shaft. With this plan applied to a building, in conjunction with an air-pump ventilator and proper air inlets, as provided for in Messrs. Boyle's system of ventilation, there is no reason why the atmosphere of the building should

not be as pure and fresh as that outside. We may mention that, if double pipes only were used, without the intermediate packing, the result would be little better than if only one pipe was used, as the current of cool air passing up between the pipes would conduce to condensation, and the warmth it absorbed would heat up and be radiated from the outer pipe.



This invention of Messrs. Boyle's has been examined by a number of the most eminent, practical, and scientific authorities in the kingdom, and has received their unqualified approval and commendation. We feel sure that this is but a forecast of the reception it will receive at the hands of the public when it becomes known, and the great benefits to be derived from it are realised; and we have no doubt that it is destined to create a complete and much-needed revolution in the whole of our existing gas-fitting arrangements.

DIETETIC NOVELTIES.

FRY'S MALTED COCOA.

Amongst recent food products, Fry's Malted Cocoa prepared with the pure cocoa paste of these eminent manufacturers and with Allen & Hanbury's Malted Extract, is a dietetic of considerable value and destined for large popular use. By removing the superfluous fat of the Cocoa, a drink is obtained which is less rich and cloying than many of the chocolates in use, whilst the addition of the malted extract supplies an agent of active digestion which helps the assimilation of food. It is a very pleasant beverage, and adapted for the breakfast table.

CHATEAU PALUGYAY WINE.

Messrs. Kinen and Fabre of 179, Regent Street, have been appointed agents by Messrs. J. Palugyay and Son, of Presburg, the makers, for the sale of this excellent Hungarian wine. Hungarian wines, except those of the highest class, are generally reproached with being somewhat rough and wanting in those qualities of manufacture which are essential to their maturing and keeping, and which probably, in some measure from long 'use and wont' are seldom found absent in the produce of the French vineyards. No faults of this kind can, however, be detected in the Chateau Palugyay wine; of a Burgundy character, sound and soft enough to please the most fastidious palate, it is further recommended by its agreeable and characteristic *bouquet*. One of the qualities here enumerated, the soundness of the wine, renders it specially suitable as a tonic in cases of anæmia and kindred ailments where red wine is needed, whilst its agreeable qualities of flavour will reccommend it equally to the great number of persons who habitually use Burgundy wine as the usual stimulant taken with their luncheon and dinner. Should the Chateau Palugyay wine maintain the high standard of the sample which has been submitted to our investigation, which we see no reason to doubt, it will certainly gain deserved favour with physician, patient, and public.

SANITARY JOTTINGS.

At the recent Philosophical Society's Exhibition at Glasgow, Mr. W. P. Buchan received the first-class certificate (highest award) for his patent ventilating drain trap, and the same for his patent Carmichael wash-down accessible water-closet. ——Dr. Ward, Medical Officer of Health to the Workington Local Board (Cumberland), has represented the necessity for providing flushing appliances to the sewerage system, laid down some fifteen years ago. The subject is under consideration.——C. Werkowitsch and v. Klenze (*Bied. Centr.*, 1880, 469, 470) give the following method for taking samples of milk: The milk should be well stirred, and a sample taken from the middle by inserting an inverted beaker in the liquid, reversing, and drawing it out.

Colonel George C. Waring, Junr. (*Plumber and Sanitary Engineer*), formulates his views on malaria, its causes and means of preventing it, as follows:— The invasion of salt water to low lands along the river leads to an aggravation of the marsh miasma produced therein. Accumulations of organic matter along the course of running streams, whether caused by slight obstructions of the channel or by dams, may be decidedly deleterious. No body of water, large or small, may safely be retained of which the level is subject to variation, for the reason that this variation exposes to the air the organic matter deposited along the water's edge, and generally in a state of saturation. While this is emphatically true concerning the actual exposure of organic deposits, it is relatively true with regard to deposits covered by so little water as to bring them within the influence of the sun's rays. Even the obvious wetting of the ground by springs, by the exuding of water through the banks or dams of ponds, or by the too great width of the bottom of the ravine over which a brook runs, may be injurious. The accumulation of leaves, branches of trees, etc., in shaded spots, may lead to danger. The stagnation of air is even worse than the stagnation of water, for the reason that the stagnant air is generally accompanied by the presence of decomposing organic matter, which is sufficiently damp for the worst results. While the heat of the sun may be a source of evil in the case of the saturated edges of a pond and of accumulations of decomposing matter under shallow water, its influence upon the surface of dry ground can be only beneficial. Drainage should in all cases be so complete that there can be no water of saturation in the soil nearer than two feet from the surface, except immediately after heavy rains.

A strong effort is being made by a committee of the ratepayers of Westminster to secure, for a recreation ground, the burial ground of St. John the Evangelist, in opposition to the purpose of the District Board of Works to use the space for the erection of a mortuary upon it.

ORIGINAL PAPERS.

THE LAW IN RELATION TO SANITARY PROGRESS.*

By W. H. MICHAEL, Esq., Q.C., F.C.S.

In the Ancient Temples of Japan wheels hang suspended from the walls, to which are attached copies of the sacred writings. These wheels, as an act of devotion, are turned round by the obedient and adoring worshippers of the Buddha Sakan Moune, in accordance with his divine command, "Make the wheel of the law turn." A similar labour is performed by those wishing to be learned in the law, but who, having no time or inclination to master the eight written books of divinely communicated wisdom, cause a ponderous book-case containing these scriptures to revolve on its pivot, and this, often enough repeated, is accounted to them as the knowledge of the incomprehensible.

"The intention is accounted as valuable as the act."

Are we entirely free from such devices in the execution of our laws, and in the practices of "how not to do it" of our local parliaments and local executive? Is the statement true which was made by a speaker claiming authority, at a recent sanitary meeting, that out of 70,000 houses built annually in London, 50,000 are unfit for human habitation. And further, this statement has been commented upon by a leading London newspaper as being a disgrace to the Local Government Board.

It is not easy to determine whether the acquaintance of the speaker and the writer with the facts and law of the case are equal; but it is a strange, though true, commentary upon both that the Local Government Board has no voice in, or control over, the sanitary regulation of the metropolis.

By what at least to outsiders seemed to be a strange turn of the wheel of the Law, the Metropolis was altogether excluded from the operation of the Public Health Act, 1875, to which every other portion of England and Wales was made subject. One would often like to say "a truce to definitions", but in the present condition of sanitary science and sanitary action this is neither practicable nor desirable. And this at least is an instance in which the meaning of "uninhabitable" should be clearly explained, in order to take some action on a state of things which, if it has in any degree a foundation in fact, reflects infinite discredit on the local government of the various sections of the Metropolis. Without in any way reflecting on the authority of the Speaker, it may be urged, considering the present temper of the public mind, that unless provided with the most exact and thoroughly statistical and scientific information, it behoves those who wish for enlarged sanitary power and extended sanitary action to exercise the greatest self-restraint and care; and direct proof should not only be forthcoming, but at the time adduced and appended to every statement of alleged shortcomings of authorities in the execution of the Sanitary Acts. The objects of these Acts shortly stated are: to provide for us in our houses and streets, dry subsoil, fresh air, and pure water. To obtain these desiderata is no easy task, not so much from inherent obstacles, as from those which we have ourselves created by faulty action or continued neglect, surrounding us on every hand with complications and impediments which defy complete enumeration. The natural impatience of taxation is intensified when the taxpayer is called on to pay his hardly earned monies to procure assumed benefits he has not yet learned to appreciate at their proper worth, and with respect to which he entertains strong doubts whether work undertaken for his alleged protection will be succeeded by results at all worth their cost.

This is so important a factor in considering the law with respect to future action, that it may be explicitly stated from ample experience, that permissive legislation in sanitary matters is something worse than useless. Health is to be provided for the ratepayer, and especially for the neighbour of the ratepayer, without his consent first asked and obtained, and by slow but successive stages all our legislation is becoming modelled on this principle. Although we are not without warnings that old mistakes are only waiting the opportunity again to assert themselves, still it must not be forgotten, as a leading principle, that no laws having to deal with the person as such, can hope to be thoroughly successful in action if their provisions extend far beyond the education and convictions of the general public. It is true that the law should be somewhat in advance of popular belief, for laws should themselves educate by their teachings and sanctions; but if pushed too far they provoke, as in the past they have often done, although themselves entirely in accord with the principle of utility, so violent an opposition, as to defeat their proper objects, and throw back on the dial of progress a long continuing shadow of revolt and inaction.

Of this we are the witnesses on the great subject of sanitary progress, and we have been the sufferers, with those we most earnestly wish to protect. In view of the difficulties which beset the question, we might well despair, were it not that our greatest successes have been the outcome of our greatest defeats, from which we have learned both how to labour and how to wait.

To reform the laws, to ensure the adoption of more stringent provisions for improving the public health, we must be content with much less of advance than we know to be useful, and we must be prepared, not only for the glory of conflict with what is hurtful and pernicious, but for the much more difficult task of patient waiting and laborious drudgery to get our opinions adopted, and to ensure the enactment of laws, of the necessity for which we have been long convinced, and for which we believe there is forthcoming overwhelming proof.

Our legislators, after the most searching, and long continued enquiry, conducted by the most competent and painstaking enquirers in all countries, have been at last satisfied that one of the most loathsome diseases, and one of the direst scourges that ever afflicted humanity, is controlled exactly in proportion as the operation of vaccination is well and thoroughly performed among the population. That those nations where it is compulsory on the whole population, and where the law is enforced with the greatest care and precision, that there the disease is almost obliterated. That in exact proportion to this care and precision in various communities is the amount of immunity; that this immunity commences exactly at the age, whether three, six, or twelve months, when, in the several countries, the performance on the infant of the protective Act becomes imperative; that large bodies of men aggregated together, in different localities, of differing nationalities, but under similar sanitary conditions, except in the particular of vacci-

* Read before the Sanitary Institute of Great Britain, Feb. 11, 1881.

nation, differed in their mortality from small-pox, almost identically in proportion as the use of the prophylactic was enforcible and enforced by authority, while the mortality from other diseases of epidemic or endemic character, such as dysentery, cholera, or typhoid fever, followed the usual laws of suffering from neglect of sanitary precautions; for while the deaths from small-pox were in proportion to the absence of vaccination, an entirely different ratio was observed in the mortality from other preventible diseases.

Since this protective agency has been discovered and used, doctors and nurses can attend hundreds and thousands of cases of the most virulent character without themselves being sufferers. A careful and exhaustive enquiry into cases of alleged injury from vaccination show that less than 50 out of more than three million cases of performance of the operation investigated, were really proved,* which now, with the improved knowledge and means at our disposal, can never recur; and the direful roll of death and deformity from its beginning to its end, demonstrates that the ratio of deaths continually decreases as the unvaccinated give place to those upon whom the operation has been successfully performed, and these further diminish in exact proportion as the scars left by it show that it had been more or less carefully and efficiently carried out.

As a result of this mass of overwhelming proof, the law makes vaccination compulsory, or rather it imposes, and now happily continues to re-impose, a fine upon those who disobey its behests. But should it not go further? and when consecutive fines show the obstinacy of the parents or guardians against complying with the provisions of the law, should it not, in the interests of society, by its own officers, provide for obedience, by itself, undertaking the operation, and thus securing the protection?

But this it is alleged is an unwarrantable interference with the liberty of the subject; to which I have only to reply, that the sooner the subject is deprived of the liberty to spread misery, disease and death among an innocent and helpless community, the better for all classes of her Majesty's subjects. This instance of compulsory application of law to the person to protect the public may have for its pendant another proposed application of the same principle to property, in order, if possible, to draw a broad line of demarcation between what should and what should not be compulsory, and also to lay down the rules which, in the opinion of the writer, should determine the question in all cases of acknowledged public injury: 1st, there should be certainty as to the cause of the injury; 2nd, certainty as to the efficiency of the proposed remedy; and 3rd, that the remedy is productive of no evil effects, and may advantageously be adopted. At the commencement of the present winter season we were assured that the prevalence of London fogs was constantly on the increase, both as to frequency and severity, owing to the ever-increasing volumes of smoke sent into the atmosphere of the Metropolis from houses, hotels, clubs, manufactories, and the like, and it was urged that the time had come for passing a law not only compelling every house to consume its own smoke, but rendering imperative the use of gas as a heating medium, or the adoption of anthracite or some other of the class of smokeless coals for general domestic use. By the speeches and writings of public men and by the action of societies, much attention has of late been called to the question as one of urgent importance, and as one affecting public health and public property.

But whether the presiding genius of fogs was alarmed at the array of talent and energy brought to bear against his missives, or whether to save us from a blunder, it has fortunately happened that spite of cold, frost, snow, and other sad visitations, the months when London is most usually visited have been singularly and most exceptionally free from dense fogs, and, with the exception of the frost of the past month, the close of the year was as bright and delightful as that of its predecessor, 1879, was dismal and dark, and certainly as fine a one as with our climate we can ever expect to enjoy. This at once disposed of the allegation that fogs are altogether dependant on the presence of smoke over which we have control, and that as this last increases as the cause, so the result inevitably follows, in augmentation of the number and severity of fogs, such serious troublers of our rest, comfort and cleanliness.

The aqueous particles which make up London fogs, with their envelopes of dust and hydrocarbons, require no smoke to put on their very densest and yellowest of mantles; and dust created by gas and perfectly invisible, or from any other source of heat, or the thousand and one producers of dirt and dust in our great metropolis, are factors equal in production to the very densest smoke from the most frequented and fashionable of our Clubhouses. Here our sources of certainty, authorizing compulsory application of certain remedies, entirely break down, and we further know that places far removed from the alleged causes of complaint, and without them in fact, and where the operation of the proposed remedy would be *nil*, suffer equally with ourselves from the infliction of ills inherent to our physiographical condition.

There are two causes always in action, and always tending to undermine and to break down either insidiously and indirectly, or directly and suddenly, the public health.

The first of these is defective sanitary condition of our dwellings, either defects of primary construction, or defects of care and continued attention to healthful conditions; and the second depends either on waves of malarious influence, the creators of algide and other fevers, or upon the communication of infectious diseases from person to person, from neglect of isolation of such cases of illness. Whatever may be the nature of malaria, whether germ or ferment, with their sources in dismal swamps of vast extent, reeking with masses of decaying vegetable and animal matter, with these we cannot now, if we can ever, hope to contend. But this we can do, we can build up in every individual, by following sanitary teachings, a wall of resistance, a fort to resist attack, and this is the first cue of sanitary science. It seeks to remove from the dwelling all accumulations of filth, and so to ensure that there shall be within or without the dwelling no bodies in which these diseases, although never self-originated, may yet develope and spread; to sweep away all the conditions favourable to their existence—for only when such conditions exist can they create disease. If it were not so, if men were not, as they now are, endowed either naturally or by attention to sanitary regulation of their houses and of themselves, with varying powers of resistance, all would fall alike victims to an epidemic of cholera, or scarlet fever, or dysentery; but the fact is, that it is only those whose powers of defence are, from whatever cause, reduced below the forces of attack, who fall victims to the onslaught. The law helps the

* *The Truth about Vaccination.* London: Smith, Elder & Co., Waterloo Place.

defence by creating, or striving to create, conditions which drive away all traitors from the camp, agencies tending to reduce the *vis vitæ* of the combatants. It is because it has not effectually done this in the past that we have often to reap a sad harvest of suffering and death. General legislation before 1848, when the first Public Health Act became law, was practically *nil*, and even then it was to a large extent permissible, so far as the statute law was concerned, for large communities, by every inhabitant, to poison the air, not only of his own dwelling, but that of his neighbours, by foul emanations from receptacles or gouts of filth and other producers of disease.

Ten years after this came the Local Government Act of 1858, but no sanitary action was compulsory upon any Authority until the Sanitary Act of 1866; and this Act, although amended year by year, was found to be practically unworkable, because, to use a sporting phrase, the fishing was with too long a line—the rod being held by the Local Government Board in London, with a line of command expected not only to control, but to capture the enemy, and make him a tractable and working slave in Northumberland. Then, after the labours of the Sanitary Commission, came the Public Health Act, 1872, which divided the whole country into sanitary districts, with varying powers, as these districts were called urban or rural. By the first Public Health Act of 1848, it was enacted that the Act might be adopted by the ratepayers of any district after certain preliminaries. In many cases it was so adopted for the express purpose of avoiding the necessity of doing anything or spending a single penny in furtherance of its provisions. Once the Act had been adopted, and the district was free from contribution to the Highway Board of the district. The Local Boards were elected, and never met for the dispatch of business. This necessitated the passing of another Act, limiting the adoption of the Public Health Act to districts which contained at least a certain minimum number of inhabitants, except with the consent of the Local Government Board. Then came another Act, allowing small districts, called special drainage districts, to be carved out of large ones—a special provision for inaction and misrule.

When the Public Health Act, 1872, swept away sewerage and special drainage districts, and divided the whole country into urban and sanitary districts, a large portion of all the urban districts were rural, and of the rural districts urban; so rural districts, often consisting of large villages as large as the urban towns, were left without control over the highways, and without any power to make bye-laws regulating buildings or streets or roads. From this state of things has grown up an aggravated insanitary condition, continually getting worse, creating some of the greatest difficulties to be to-day contended with by the arm of sanitary progress. On the outskirts of populous and prosperous urban districts manufacturers, to avoid control and the payment of rates, (borough and general district rates), have set up their works, quickly to become surrounded by a teeming population, denser than the very towns to which they have become suburbs. Here, without control and without the pretence of sanitary supervision, everyone has hunted his own hare and has built his house in accordance with his own whim and will, and in most cases with the most utter contempt for sanitary precautions. Thus it happens, that one side of a street in these districts is urban and is stringently governed upon the most approved principles, and the other, the rural—well the least said the soonest mended, but everyone conversant with these matters knows the scenes to be met with in such localities, the description of which seems like the grossest exaggeration in a civilized country pretending to advanced progress.

What a farce is sanitary protection under such circumstances, as though disease and death would be arrested on their way to take note of the arbitrary divisions of districts created by the greed of wealth, and maintained because their removal would entail monetary burdens on self-interest in exchange for benefit to others. Every day's delay in providing a remedy makes it, when obtained, the more costly and difficult of application, unless some great calamity like the fire of London shall come to remove these precursors of plague. But, however far away in the provinces may be these centres of disease, we are here in the metropolis all deeply interested in their removal, for in sanitary matters what is local is general—not merely as affecting national prosperity, but as influencing in a greater or less degree the health and safety of every member of the community.

Are we to allow this state of things to go on increasing, as it is daily doing, with only such protest as is to be seen by the introduction into Parliament every session of three or four private Bills, by which the municipal authority of boroughs strive to extend their boundaries, in order to include and lay under rule these recognised sources of injury. But nothing is more difficult than to secure the success of such attempts at private legislation—opposed always on the score of the entailed additional pecuniary burden which they involve, for committees of both Houses of the Legislature are most unwilling to oppose burdens on property, especially when these should be in conformity with general instead of patchwork and piecemeal legislation. It is much to be regretted that before the passing the Act of 1875, which consolidated with itself all existing legislation, a Commission had not been appointed to enquire into the difficulties which had been met with by sanitary authorities in carrying into effect the provisions of the Act of 1872, and also what were the boundaries of districts that should be determined on in the case of each sanitary authority. It is firmly believed such a Commission would have recommended that the distinction between rural and urban sanitary districts and authorities should be removed. For if we are to judge by experience, these have been productive of little else than difficulty and confusion in the working of the Sanitary Acts.

In lieu of splitting up districts and dividing duties and responsibilities, it is suggested that what is urgently required, both with regard to efficiency and economy, is how to ascertain in each county what should be the limits for municipal purposes within which one local authority should exercise all powers of poor relief, education, town government, sanitary supervision, and all other functions under one taxing authority. Sufficient elasticity might be provided for all inequalities of town and country, houses and lands, by making the amount of rating depend upon the benefits conferred, and modifying the stringency of the law in certain cases in view of the conditions existing or required. There are wider limits than these within which experience has taught us powers must be exercised, and for these, and in order to secure other advantages resulting from the establishment of a strong intermediate authority between local bodies and a central direction, county boards are required. To such authorities, consisting of the chairman of

each several local district within the ambit of the county, with the addition of an element of representatives from the magistracy, might well be entrusted those compulsory powers which already exist for enforcing due sanitary provision in every district, to enquire into and report upon the applications of local authorities for powers to acquire land for the disposal of sewage, to report upon joint works, and in certain cases to carry them out, to manage county institutions and finance, and to act as an appellant authority in conflicts occurring between local boards and their constituents; cases in which the presence of a board of high authority and clothed with quasi-judicial functions would be of immense advantage.

To such a county authority should also be entrusted the conservation of river basins and the power of a water trust. It is discouraging to witness again this session the introduction of a measure for a river conservancy on the old lines of optional adoption, proposing to create a new authority with arbitrary districts. Either we are without sufficient information to enable a general measure of protection against floods and conservatism of rivers for the good of the whole land to be passed by Parliament, in which case we should at once strive to obtain the required knowledge; or, if we are in possession of adequate information, every year's delay makes the difficulty of dealing with the question more embarrassing, by allowing further private interests to grow up, and further complicate a question already beset with enormous difficulties—not the least of which is the appropriation of water by districts or individuals entirely independent of their own appropriate water-shed areas and areas of supply. There are no words with which we can measure the importance of this question, both as to the domestic and manufacturing use of water.

To these must be added the further great question of injury from floods, making us suffer equally from too much and too little of Nature's greatest boon. It is sufficient to condemn the partial character of the present measure that the greatest of our rivers—the Thames—and the one most urgently calling for treatment, is to be excluded from the operation of the Bill. But we want to know more about water; more as to the subterranean stores which may be utilised, and much more as to the best measures for storing what we have already ascertained to be at hand for use, but which now becomes a curse instead of a blessing. We must recognise the fact, however much we may agitate for cheap supply of water to our town populations, that the rich in this case must pay for the poor, that no restrictions, as in the case of gas, can be put on its fullest use, and whether in the metropolis or elsewhere we shall be forced to the adoption of general rating by a public body, as a payment, instead of payment for quantity. This will make the use of the public supply question compulsory, for the payment will follow, whether the water be used or not, with relief in certain cases on the basis of the exemptions in the Public Health Act, and in the incidence of the Inhabited House Duty. If, indeed, public health is public wealth, the importance of its conservation should have greater recognition in the machinery of the state, and its proper estimation should be enforced by the creation of a ministry of health charged with the supervision of all Sanitary Authorities, not merely as a controlling body to regulate expenditure, but to afford help and encouragement when required, and by its influence and character to smooth over the daily obstacles which are inevitable, if local authorities are to act up to the spirit of the law, even as it now is, without taking into account popular prejudice against further extensions.

What then is most required is the reconstitution of authorities, so that powers already granted may be better used for the good of the public, rather than the increase of the powers themselves; in almost all cases these in the hands of such authorities will be found adequate, but it is not so in every particular. If opportunity offer, we crush beneath the heel of our boot the head of any venomous reptile that may come in our way, to prevent injury to ourselves as well as to others. We should hardly think of exciting the beast by the toe of a dress shoe, to sting us to our death. Yet how do we deal at the present time with cases of infectious diseases occurring in our midst, one of the great sources of danger to the public health which we can easily stamp out, but which we deliberately allow to run their course unmolested. If a member of our own family should unhappily be laid up with an attack of measles or scarlet fever, we, as soon as it is known, become isolated and cut off from our social belongings. Our friends no longer call upon us, we are prevented from going into society, and our acquaintances, when they meet us, rein up their horses at a safe distance from the curb of the pavement on which we stand, while they enquire as to the sanitary condition of our little home community. At the same time, these very friends and acquaintances, in shops, offices, or warehouses which they frequent or use, in laundries, and in workshops, are daily shaking hands with infection, and dealing with persons who come straight from their habitations, where infectious disease is present, and, in their clothes and otherwise, who convey to the unsuspecting the matters which engender disease. The tailor who makes or mends our coat does so in the company of measles or small-pox; the laundress, who is busy with the garments soon to be applied as coverings to those we love best, bestows her cares equally on the snowy surface of our linen and on the scarlet desquamating skin of her child, and then we wonder at the spread of infectious disease, and that so little good results from sanitary measures, as though sewers and ventilating apparatus outside our houses were all that is required, and that the interiors, and all that there occurs, is beyond the need of our attention and our laws.

We have the means at hand effectually to stamp out infectious disease at its first approach. Already, private legislation has in several towns gone far ahead of general provisions of the law for the public safety, and in these towns it is obligatory on the householder under penalties to give the earliest information to the Medical Officer of Health of the occurrence in his house or premises of every case of infectious disease. There is, however, more than this required, and it will sooner or later, spite of sentimental outcry, be adopted in the isolation of such cases in special hospitals under carefully considered conditions, where the treatment of cases can be best carried on, and the subsequent convalescent placed under the most favourable conditions. This will be done primarily in the interests of the healthy as against the sick, but with an equal amount of benefit to the sufferers themselves, and to their relatives and friends. Such a system efficiently carried out would in a limited period add five years to the mean duration of life in this country. And who is there here who can sum up in figures the amount of suffering

and misery which is represented in the five years thus cut off the short span of our existence?

At present sanitary authorities require teaching equally with their constituents. Let us do what we can to instruct them. But those of us who are most urgent for improved law as an agent in sanitary progress are the first to recognise the truth—that all external law will be useless unless every man in his own sphere, and specially in his own house, becomes a law unto himself.

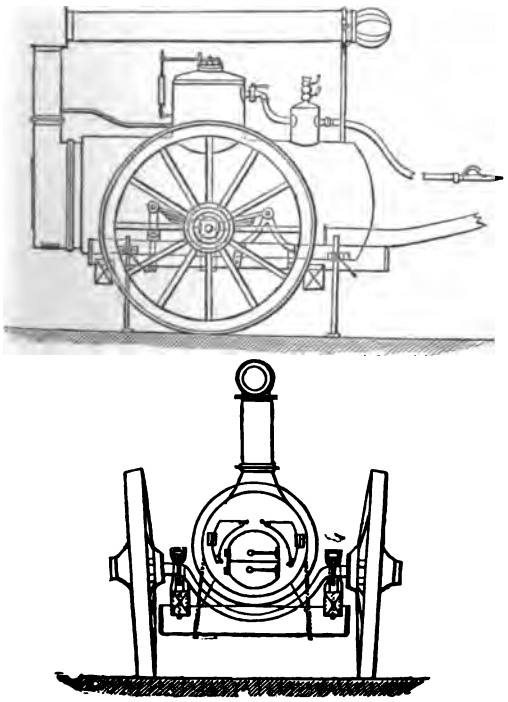
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 208.)

AIR.—XXXVII.

Disinfection by Hot Air, etc., (continued.)—I will now describe a system of disinfection which is in use in France, and in which steam is used. It is especially applicable to the cleansing of infected rooms, and is the invention of Messrs. Weyer and Richardson, engineers.



Weyer and Richardson's Disinfecting Apparatus.

This apparatus consists of a 5-horse power steam boiler, and is furnished with all requisite appurtenances. It is fitted at the top with a box of special design, to which is given the name of 'Antiseptic Box.' The boiler, as manufactured by the makers, is mounted on a specially constructed two-wheeled truck, thus admitting of its being easily taken from place to place as may be required.

The steam, on issuing from the boiler, is made to pass through the antiseptic box, where it becomes charged with the ingredients therein contained (a special contrivance regulating the degree of saturation according to requirement), and is thence carried where needed by an india-rubber hose of special make, and fitted at the other end with a copper spout having a wooden handle. The nozzle, or mouthpiece of the spout, can be altered at will, and made to assume a flat, round, or oval shape, according to the surfaces to be steamed or operated upon.

When issuing from the engine at a pressure of 75 to 90 lbs., the steam can easily be obtained at a temperature of 140°, and, since the extremity of the spout is in immediate contact with the surface to be disinfected, the amount of expansion is very trifling; so that the steam, retaining the same temperature, so to speak, say 130° to 135°, entirely destroys the microphytes or germs deposited upon the surfaces against which it is directed. The apparatus therefore takes a very simple shape. It needs but two men to work it; and can, moreover, be recommended on the score of economy as regards consumption of fuel, for it burns no more than a sack of coals per day.

Not only is this apparatus a good disinfector, but it is capable of rendering great service as a cleansing machine as well; for under the action of the jet of clean water steam shooting out of the spout under a pressure of 75 to 90 lbs., and at a temperature of 140°, fatty and albuminous animal matter melts, coagulates, strips off and falls away. The paint on wainscot and wall undergoes no injurious alteration; in fact, it will stand out brighter than ever. Whitewash or distemper, on the other hand, will of course be destroyed, because the coat of lime or lead will swell, shred, and come off. This proves the thorough efficiency of the operation, since nothing can adhere concealed either over or under such a spongy coat.

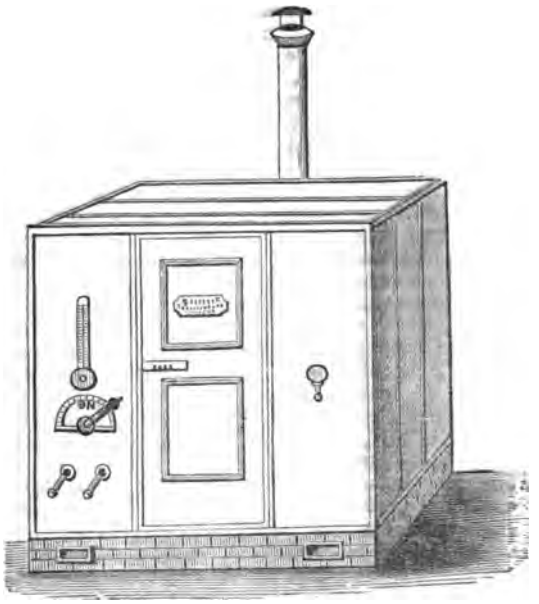
To illustrate the mode of procedure by an example. We will take an *infected room*, for instance:—

To begin with, all the bedding, hangings, and carpets are cleared away, and taken to the disinfecting stove or oven. The engine is then brought to a spot as near the house as circumstances will admit, whether in the street, garden, or yard, and the india-rubber hose carried into the room, either up the stairs or in at the window. From the spout is now directed the stream of vapour in regular and continuous motions from below upwards against every surface, wall, floor, ceiling, etc. With such a machine two square yards per minute can be treated. If the rooms are papered the paper will, of course, rise in patches and come off; if they are coated with sized paint, the slight layer of white must go; and in both these cases it will be necessary to cover the walls anew. But if oil paint has been originally used the walls will be both disinfected and thoroughly washed clean under one and the same operation.

Supposing this room to measure six yards in length, four in width, and four in height, we shall have a superficies of about 128 yards. But as the disinfecting process can be carried out at the rate of two yards per minute it would take altogether to complete the work just sixty-four minutes, or one hour and four minutes, say, in round numbers, one hour and a quarter, allowing eleven minutes per hour for the men to take rest.

Reverting to the systems of disinfection by hot air, Dr. Charles Mason Scott, whose experience of the need of disinfecting clothing was gained chiefly during fifteen years' residence in various ports in China, and who is now practising as a physician and surgeon in Dalkey (Co. Dublin), devised a very excellent method of disinfection by hot air, and with his assistance Messrs. Maguire and Son of Dublin, have reduced and simplified, as far as may be, the theory to successful practice. In order to produce a

portable, or partially portable, apparatus capable of being adapted to the various requirements—as to size, position, cost, etc.—of different institutions and corporations, they have constructed non-conducting



Dr. Scott's Disinfecting Chamber (Hot Air System).

composite chambers so thoroughly non-conducting as to be cold outside while 300° inside. These chambers are formed in parts ready for screwing or bolting together without difficulty in the country for the larger sizes, while the smaller sizes, 4′ 0″ × 3′ 6″ × 6′ 0″, are sent out bolted together and ready to place in position and to work.

In the portable apparatus one door only is generally supplied; but, where desirable, two can be provided, with the object of not bringing back the purified clothes and bedding into the chamber where they lay or passed through when foul, on their way to the purifying chamber. In these gas-heating chambers a powerful arrangement of burners is used, giving the greatest heat with smallest waste; and there are from two to six stop valves, according to the size of the chamber, so that, with a little experience on the part of the attendant, almost any temperature can be attained and maintained. An arrangement is also supplied by which, if the heat ever by any mischance exceeds 320° the gas is shut off in automatic manner, and with each apparatus a first-class pyrometer for reading outside the chamber is supplied.

In one apparatus of this kind, fixed with gas heating apparatus the temperature rose in ten minutes from 40° to 260°, and in fifteen minutes to 300°, at which it continued to stand. But it is adjusted to stand, usually, at 270°, which is the safest temperature, having regard to the fabrics when dried being injured. Half an hour of this heat is sufficient to destroy all trace of vermin, and all danger of infection in clothes, if well exposed in the chamber; but for bedding an hour should be allowed at 270°, or half an hour at 300°.

For poor law unions, or places where rough usage is expected, it is preferable to build the chambers of solid brickwork. These cost more money and take more time to erect and complete satisfactorily, as much of the testing and adjusting done in the factory with the portable apparatus has to be done at greater expense in the country, where chambers are erected.

THE MODE OF SLAYING ANIMALS FOR FOOD AMONGST THE JEWS.*

By Maurice Davis, M.D.

Some years ago, the Society for the Prevention of Cruelty to Animals took legal proceedings against the Jewish butchers for cruelty in their mode of slaughtering animals for food; but the late Mr. John Hilton with others, gave evidence in favour of the Jewish method, and the defendants having succeeded in satisfying the magistrates that there were no grounds for the charge, the case was dismissed, to take its place amongst the memories of those many acts of meddling which that very obtrusive, though very useful, society is so prone to commit.

Dr. Rabbinowicz of Paris is engaged in writing a large work upon the civil legislation of the Talmud, and in the division assigned to the consideration of the manner of slaughtering animals for food, he retorts upon the Society their own charges, and advises the members, instead of complaining of the practice exercised by the Jews, to take a lesson from it, or, rather, require their slaughtermen to do so. He considers that the bearing of an animal under pain is no measure of the acuteness of its suffering, as some creatures are more patient under agony than others; and he doubts whether the infliction of a blow in the cerebral region, whilst it destroys the power of motion, does necessarily annul sensibility to pain. Even, however, if it does, this blow is often delivered in an inefficient manner, and if the poleaxe be used by an incompetent operator, even the extreme degree of stillness may not be ensured, and the animal may be on the point of recovering from the shock, when it is exposed to a rude hand armed with a rough-edged knife. A skilled pole-axe man should fell an ox at one blow; but an examination of the hides at any tan-yard, especially of those sent from certain parts of the country, will prove, by the numerous orifices, some not reaching to the inner table of the cranium, and the splintering of the horn sockets, that many a 'prentice hand' had taken its lesson in the death throes of the animal.

But, even in the hands of the most competent, repeated blows are sometimes needed before the stunning effects are produced, as often the bones of the skull are found to be especially thick and resistent. No such practice is likely to happen under the teaching of the Talmudists, who have prescribed a most minute and wide-reaching system, imbued with the greatest tenderness and humanity towards the creatures intended for human food.

Amongst barbarous nations, it was no uncommon habit to feed upon the bodies of animals that had died from disease or violence, and instances abound of such nations devouring flesh cut from the flank of the living animal, a habit which still persists in Abyssinia. Laws of the Talmud, founded upon the denunciations in the Pentateuch, sternly proscribe these practices. The prohibition to use as food any part of a living animal was enforced by the early Christians, who were Jews, upon the Pagans whom they had converted; and it is one of the seven

* Legislation civile du Talmud—Les principes Talmudiques de Schehitah et de Terepha, manière de tuer les animaux, et leurs maladies au point de vue médical, par le Dr. Israel-Michel Rabbinowicz. Paris: chez l'Auteur, 63, Rue de Seine.

ordinances which the Talmud enjoins upon Pagans converted to Monotheism, as being applicable to all the sons of Noah.

The Talmudic laws require that the animal shall be deprived of life by the sweep of a long sharp instrument, which shall at once sever, more or less completely, the trachea and œsophagus. Rabbi Judah insisted that the arteries also should be divided, notwithstanding that at that time, some seventeen centuries ago, arteries, as the name implies, were believed to contain only air. But the minds of his colleagues were not prepared for this advanced physiology, and could not be convinced that as death from hæmorrhage always did follow the treatment they had laid down, it was not, therefore, a necessary consequence of section of the windpipe and gullet, and that it designedly fulfilled the Biblical command, 'Only ye shall not eat the blood, ye shall pour it upon the earth as water.' Although it may be possible, by a careless, perverse, or even literal, fulfilment of these thoughtful and laborious instructions, to evade their spirit and object, and although Rabbi Judah's idea was not accepted, yet his practice was; for the vessels, as a matter of fact, as well as the important nerves in and about their sheath, are divided, the blood is poured out like water upon the earth, and the animal, therefore, speedily faints into insensibility and dies of hæmorrhage.

Talmudists were not members of the 'Society for the Prevention of Cruelty to Animals', but were members of the ancient society of the sons of Jacob, which included an entire nation, the duty of each individual member of which was the protection of all living creatures. No more benign laws could be framed than those in the Pentateuch, already in their possession, teeming with commands enjoining tenderness to animals, and no soil could be better prepared for the reception of those humane commands than the mind of the rabbi, imbued as it was with the love of animals, and ready to adopt the smallest indication to justify a law in their favour. 'And I will send grass in thy fields for thy cattle, that thou mayest eat and be full.'—*Deut.* xi, 15. Whatever may be the general interpretation of this passage, the beast was not without its advocates amongst the rabbins, for it was held that the earlier mention of cattle in this verse was a reason for demanding for animals the first consideration, and the law was enacted that 'It is forbidden to eat a meal until the domestic animals are fed', and the observance is still carried out to the letter in many Jewish families.

This society, then, through the medium of its sages as a committee, framed a code of laws for slaying animals for the use of man, which, like that of modern surgery, was designed to render the necessary process as far as possible 'cito, tuto, et jucunde'. The essence of this code is something after the following outline:—

1. The steps shall be continuous; any interruption, however minute, in the process being likely to prolong the sufferings of the animal, will render it unfit for food.

2. The incision shall be made by a to-and-fro stroke, without any pressure beyond what is necessary to carry the knife down to the required depth.

3. The incision in the skin shall accurately coincide in length with the deeper portion, so as to leave no 'tail' to the wound; for the skin being the most sensitive tissue, humane considerations for the animal forbid that it shall be needlessly wounded.

4. The wound shall not be made so high as to risk contact of the knife with the osseous structures above the cartilaginous rings of the trachea, for the stroke would be thus embarrassed, and being productive of preventible suffering to the animal, would compel the rejection of its flesh as food. This law offers an additional security for the completion of the object, though not expressed, even if contemplated by the framers. The large vessels of the neck, receding as they advance towards the head, would be defended by the laryngeal structures and hyoid bone from contact with the edge of the knife.

5. It is forbidden that any tissue be torn or jagged. As the surgeon is careful to preserve a clean cutting edge to his knife, so the slayer of cattle is bound in an equal degree to set his instrument with so much care that it shall exceed in keenness that of the razor; and so great is the earnestness evinced in the fulfilment of this law, that his attention is specially directed to it, so that he may detect with his fingernail the smallest notch on the edge of his knife; and, as a test of his care and skill in the operation, he is required again to inspect his knife after the completion of it, when, if the instrument be found notched in the slightest degree, the principle is considered to have been violated and the flesh is abandoned.

The candidate for the licence to slaughter is bound to undergo a lengthened education, of which a kind of rough anatomy forms a part, and is afterwards called upon to prove his competency to the satisfaction of the appointed authorities. After this scrupulous care has been taken on behalf of animals to exclude avoidable suffering, a careful inspection of the pathological state of the beast is required to be made in the cause of man. According to the scientific knowledge of the present day, this search for diseased and injured organs might be considered capricious, eccentric, and partial, and the reasoning upon the indications, although subtle and delicate, would not be admitted in all cases as conclusive; but, measured by the standard by which the knowledge of morbid anatomy was gauged at the time those laws were framed, they will be pronounced marvels at once of comprehensiveness and minuteness, and as indicating in the legislators an earnest and penetrating observation, as well as a resolution to establish the best sanitary measures within reach of their wide, if not profound, acquaintance with the laws of physiology. Dr. Henry Behrend, in his article on 'The Communicability to Man of Diseases from Animals used as Food', which appeared in the *Jewish Chronicle*, November 12th, 1880, has reviewed some of the maladies to which edible beasts are subject. He says:—'I am myself decidedly of opinion that the care bestowed upon the examination of meat for the use of the Jewish community is an important factor in the longevity of the race, which is at present attracting so much attention, and in its comparative immunity from scrofula and tubercle, to which Dr. Gibbon, the Medical Officer of Health for Holborn, has so markediy alluded in his last Report. Naturally, such cases do not produce an immediate effect, but their transmission through innumerable generations must eventually bring about a decided result, and exercise a considerable influence in building up the mental and physical toughness of the Jewish people, which has been so long an object of wonder, and which, in conjunction with their steadfastness, cohesion, and valour, Gœthe considers to to be their chief claim before the judgment-seat of nations.'

It is difficult to determine the limits of physiological knowledge in the Talmudic era; we have seen that Rabbi Judah proposed a course by which blood should be poured out from the vessels of the neck

before arteries were known to be anything more than receptacles for air; and blood was carefully avoided before the microscope was known to have revealed the frequent presence in it of disease-germs, and before Dr. Manson had demonstrated how filariæ, the carriers of elephantiasis, were 'doomed to walk the night' in the blood of man in the large proportion of something like one in ten individuals. The practical wisdom of the law which excluded blood as human food, whatever may have been the theoretical bias which evoked it, is confirmed by microscopists in all directions. Dr. Lionel Beale says—'Disease germs reach the blood, and only after that exert their peculiar influence.' And this example, from the same work, illustrates how the blood alone may be the seat of a fully-developed and fatal disease, whilst the solid tissues may still be nutritious and wholesome food:—'It occurred to Mr. Crookes that as he could so successfully attack and destroy the floating disease germs by atmospheric disinfectants, he might so be able to neutralise the virus in the blood by the introduction into it of appropriate antiseptics. . . . . Injection of carbolic acid (4 per cent. solution) was tried on an animal having cattle-plague. Six ounces, containing 105 grains of pure carbolic acid, were injected, the animal appearing to suffer no inconvenience from it after the first trembling consequent upon the disturbing influence had subsided. The cow gradually improved, and at length perfectly recovered.'

Hallier observed micrococci in the blood of scarlet fever patients, at all stages of the disease, and in great abundance. The wool-sorter's disease has of late been absorbing much of the attention of histologists, and their investigations have tended to demonstrate that it is identical with anthrax, malignant pustule, and splenic fever. Oxen, sheep, goats, and, indeed, all warm-blooded animals, are liable to it. The presence of Bacillus Anthracis in the blood is the characteristic of the disease, and the vegetable parasite has been shown to infest the blood before the appearance of any pustule. Dr. Greenfield inoculated a cow with the blood from an infected man, and established the identity of the wool-sorter's disease with the splenic fever of cattle. These microscopic bodies may appear in the blood before and not after the development of the disease to which they give rise, and when there are no general symptoms to ensure escape from danger by the rejection of the infected animal: hence the wisdom of banishing as much as possible this immature flesh, this solution of tissues, before it has become solidified.

As an example of this fact in the human subject, Dr. Tommasi-Crudelli, Professor in the University of Rome, states, in the *London Medical Record*, Dec. 15, 1880, 'In all cases where the blood has been extracted from patients affected with malaria, during the period of invasion of the fever, it contained, often in great quantities, the fully-developed Bacillus Malariæ (Marchifava, Ferraresi). In the acme of the fever, on the contrary, the bacilli disappear, and no traces of them are found beyond their spores.' As if warned by a kind of prescience against the dangers of this 'water-way' of disease germs to the tissues of the body, the Talmudists direct that, in addition to the other precautions, certain vessels shall be removed from the joint intended for the table, and that it shall be exposed for stated periods, half an hour in water and an hour in salt, and then washed, before it is cooked. Dr. Ferrier finds that decomposition always begins in the lines of the blood-vessels; and attributes to the presence of the blood the rapid decay in the flesh of animals that have been hunted to death.

The only animals permitted for food are those which have been declared on biblical authority to be 'clean', and even these are forbidden under the following conditions:—Those that have been severely wounded by carnivora, unless they shall have survived long enough to enable the vital powers to cast off the morbid poison which it was believed an irritated animal could impart to its victim, through the instrumentality, not only of its teeth, but also of its claws. The length of interval before the animal could be slain for food depended upon the nature of the injury and the opinion of the authority pronouncing upon the point. Animals poisoned by the bite of a serpent are absolutely forbidden; monstrosities are forbidden; a congenital excess or deficiency of any organ would entail interdiction of the animal. Perforation of the cerebral meninges, the œsophagus, the urinary and gall bladder, the stomach, the intestines, or the spleen, and complete perforation of the heart, considerable atrophy of the liver, contused wound of the kidney, destruction of a certain depth and extent of skin, transverse (but not longitudinal) wound of the trachea, crushing of the cranium and brain, and tearing away of a vertebra with a rib, are amongst the conditions which debar an animal from the list of edibles. Induration of the lung after inflammation, certain discolorations of the lung, perforation involving both layers of the pleura, unless, as in the case also of perforation of the gall-bladder and stomach, the wound be filled in with organised tissue; but no adhesions of the pleura, however long the bands, are permitted to pass.

The lung seems to be the organ most diligently searched and severely tested, so that pleuro-pneumonia, tuberculosis, bronchitis, and pulmonary maladies generally, would have little chance of escaping detection. So severely may this investigation be pursued, that the lung is sometimes submitted to inflation whilst under water, for the purpose of ascertaining whether a perforation exists. The extreme care of these early students of physiology in their examination of the lungs seems to point to the dicta of modern science which indicate the air-passages with their moist mucous membranes as highly probable inlets of the morbid particles floating in the atmosphere; hence it is imperative that the lungs should undergo the close inspection prescribed, in order that before the animal is pronounced to be healthy, those important organs should be proved to have been in the highest state of efficiency, so as to resist the admission of disease-germs into the blood.

Rab, one of the chief Talmudists, placed himself under a shepherd for eighteen months, for the purpose of learning how to distinguish the curable from the incurable diseases of animals. All the ordinances of the Talmud appear to have been based upon patient observation, research, and minute examination of the bodies of animals, dead and living, so that whilst the rabbins devoted themselves to the zealous care and service of the inferior animals, they did not forget that these creatures owed a duty to their superiors; and they were in all their steps guided by the firm conviction that humanity to animals was not incompatible with regard for the health and life of man. The Talmud speaks of a *post mortem* examination of a woman made by the pupils of Rabbi Ismäel, who enumerated the several organs and bones of the body for the most part as they are known at the present day (*Treatise Bekoroth*, fol. 45). Research in anatomy and physiology was pursued by the rabbins, not only as a subject of sanitary duty,

but the study and practice of medicine were also long diligently followed by them, and many rose to high distinction and wide popularity as pathologists and physicians. Dr. Rabbinowicz has accordingly devoted to the labours of both these classes of students a volume of his curious and interesting work on the medicine of the Talmud.

In all cases where special knowledge of medicine was required to assist in framing the dietary laws, the doctors of the Talmud were accustomed to summon the physician to consultation. Less moment was evidently attached to the diseases of the other organs of the body than to those of the lungs. There are fewer directions for searching after the morbid state of those organs, for, as it was known that animals were but rarely perfectly sound in their entire system, a more rigid search would have been nearly tantamount to depriving the people altogether of animal food. But although a search into the other organs is not enjoined, any morbid condition observed by the practised eye of the slaughterer in any of those organs ensures the rejection of the animal as food.

In the case of those important filters of the blood, the kidneys and the liver, few injunctions have been given respecting them; a severe contused wound in the case of the kidney, and advanced atrophy in that of the liver, being mentioned as rendering the animal unfit for food. But the blood, which it is their special function to depurate, is utterly rejected. The rabbins trusted to the simple and literal execution of the Mosaic mandate, and, as far as they could, drained from the food of man the dangerous vital stream, and poured it forth like water, restoring to the exhausted bosom of fruitful mother Earth vigour and vitality, for 'the blood is the life'.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

II.—THE LAMBETH CLOSETS.

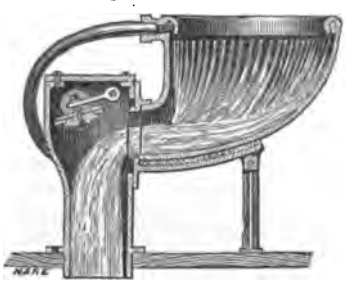
THE fact that a large amount of the sickness, and at least one-third of the deaths occurring in this country, are due to preventible diseases, arising in great measure from the foul air we breathe, and the poisonous gases which find their way into our dwellings through imperfectly-constructed closets, renders necessary the adoption of the most potent of means for arresting the most fatal and insidious of evils. The dry earth, pail, and other parts of the conservancy system associated with the names of Moule, Goux, Taylor, Weir, and others, are some of them admirably adapted for open-air use, to meet the requirements of isolated country dwellings, public institutions, and exhibitions of a temporary nature. Any system, however, favourable to accumulations of sewage such as were too commonly met with some thirty years ago, when all fæcal matter was allowed to accumulate in middens, cesspits, and the like, till putrefaction had set in, when it was utilised on our farms to the danger of the surrounding locality, must palpably be as unsuited for the general requirements of our cities and towns as it is incompatible with that degree of efficient sanitation on which the health and happiness of our community so largely depend.

The immediate disposal of excreta is a matter of the most vital importance. Many and ingenious as have been the systems for the utilisation of this sewage, we know of no system which has shown itself sufficiently remunerative to warrant its adoption on a large scale; and there can be but little doubt that the water-closet system, by reason of its cheapness, its cleanliness, and its utility, affords such advantages with regard to cities and towns, with its many ingenious arrangements (in its present state of perfection) for ventilation and inspection, as to leave little or nothing to be desired. Messrs. Doulton and Co. have given to this, as to other sanitary considerations, a large amount of attention, which has resulted in their bringing before the public a class of closets which we can but characterize as being perfect in sanitary principles, models of ingenuity, and faultless in construction.

Without doubt, the manufactory of Messrs. Doulton, at Lambeth, supplies more sanitary goods than any other place in the world, and this is, we know, saying much though by no means disparaging the fame of many other very large manufacturers. The catalogues of the goods made at Lambeth and the accompanying cuts describe nearly everything that can be desired in the matter of hygiene, and, moreover, show the high excellence of their invention and construction; and a perusal of the catalogue published in French by the Parisian agents of Messrs. Doulton is essential to every sanitary engineer if he wishes to have a knowledge of the French titles for the thousand and one articles which are now laid at the feet of the Goddess of Health.

It is our intention at present to notice several of the special closets, among which may be found articles suited for the mansion, villa, or cottage. It would serve no purpose to describe them under these heads, as no rigorous line could possibly be drawn. A house may be fitted up in part like a palace, but then even the latter must share with the cottage the kind of apparatus which best suits the use of servants.

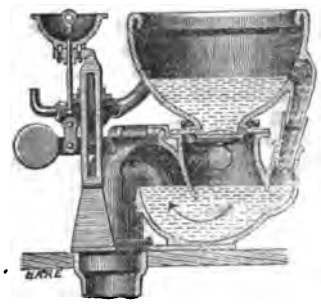
No. 13. *Lambeth Trapless Closet.*—This is an excellent closet, and possesses many great advantages over others, the chief of which are as follows: The outlet of the closet is at the side of the basin, in a vertical position, and is closed by means of a discharge-valve, in place of the objectionable plug hitherto used. This valve is of India-rubber, and has an earthenware disc over it for cleanliness (except where in actual contact with the seating), and when thrown back allows a perfectly free passage for the contents of the pan, as shown. The overflow is



nearly at the front of the basin, this position obviating the possibility of impurities passing down it. The basin of Queensware is cleansed by means of a flushing rim, and being separate from the frame of the apparatus, can be readily replaced, in case of breakage, at a small cost, and without disturbing the working parts. At the top of the closet is an inspection cover—a very advantageous arrangement,

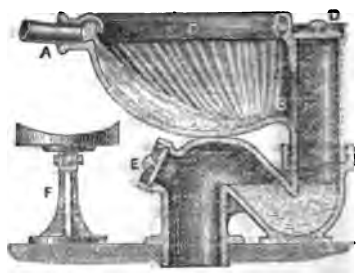
giving, as it does, a ready means of access in case of repairs, or for the removal of any foreign work. The supply valve to this closet is a speciality of Messrs. Doulton's, being patented by them; it will be hereafter described. It is so arranged as to give an after-flush on releasing the handle, and that without the assistance of a separate regulator, the quantity of water remaining in the basin being regulated as required by a screw provided for that purpose. This closet has been designed expressly to work with thoroughly ventilated soil-pipes, and experience has undoubtedly proved that in all matters pertaining to sanitary matters the more ventilation the better; to secure this end, it is advisable in every case to carry up the soil-pipe its full bore above the eaves of roof.

No. 6. *Lambeth Valve Closet.*—The valve closet is one of the oldest and most reliable water-closets, and the improvements introduced by Messrs. Doulton make it still more valuable. In the old kind, a separate trap was necessary under the basin, and there are thousands still to be found with the old lead D trap under them more or less furred up; besides all this, the trap was obliged to be fixed under the floor level, sometimes projecting beyond the ceiling below, and forming an unsightly object. The Lambeth Valve Closet obviates all this, and is thoroughly self-contained. The trap is above the



floor-line, so that in fixing it is only necessary to screw it down, connecting the outlet to the soil-pipe, and the service to the valve. By this means, all cutting away of floors, trimming of joists, service boxes, etc., is avoided. One especial advantage in this, as in Messrs. Doulton's other closets, is that the overflow is made sufficiently large to take away the full bore of an inch pipe, so that should the water-supply from any cause become deranged, there is no danger of the water rising above the top of the basin. The overflow is sealed by the water in the main body of the trap, as shown in diagram, and is, therefore, not dependent on water passing down. The trap itself is of strong salt-glazed stoneware, a material essentially adapted to all kinds of sanitary work, from its impervious nature, and its power of resistance to all action from acids or gases, etc.; and to ensure perfect freedom for the passage of the soil, these traps are lined with a white slip highly glazed. They have also an inspection inlet, with covering on the principle of the air-tight jars, patented by Messrs. Doulton some time since, and which are easily removed, and re-fixed at pleasure. There is a socket at the back of the trap for the purpose of ventilating the space between the discharge-valve and the trapping-water. Should therefore an extra pressure of sewer-air force the trap at any time, it finds an immediate escape through this ventilating pipe, and does not accumulate ready to be discharged into the house by the next user of the closet. The supply-valve is the same as the one already alluded to, and the difference between the discharge-valve of this closet and the Lambeth trapless closet being that the one is horizontal and the other vertical.

No. 14. *The Lambeth Flush-out Closet.*—This is coming largely into use for ordinary purposes; it combines efficiency with economy; and, from its simplicity, is less likely to get out of order than many other kinds. As its name implies, it relies upon a flush of water to carry all faecal and other matter over into the trap; sufficient water is always retained in the basin to prevent soil adhering thereto. The service pipe, A, is introduced immediately opposite the discharge opening, B, so as to lose none of its force, while the flushing rim, C, ensures that every part of the basin is washed. The openings, D and E, are provided for inspection, or, in the case of the



latter, as a ventilator, it required. The stand, F, is for use, under circumstances explained hereafter. Volume and velocity is the great thing needed; the arm is, therefore, made large enough for 1½ in. service. A good flush is thus secured, although there may be only a few feet pressure. These closets are made of strong salt-glazed stoneware, with white-glazed lining for cottage or servants' use, or white and figured Queensware for better-class work. They are in two pieces, so constructed that the trap may be immediately under the basin, as shown, in which case it becomes its support, or it may be placed in any other position, when the iron standard, F, is provided on which the basin rests. The trap may be had to shoot out or turn down, while the basin, being circular, may be turned any way to suit requirements. It is quite impossible for any soil to remain in these traps, as the drop from discharge opening is considerable, and the contents of basin consequently is carried away at each discharge. Care must always be taken in fixing, that the service pipe enters the arm at right angles, and where a smaller pipe than 1½ in. is used, it is necessary to fix it so that the water is properly directed. These closets are used with water-waste preventing cisterns, or with this firm's patent valves specially adapted. Messrs. Doulton make various other kinds of closets, but the foregoing are those most recommended as being suitable for every kind of work. It may be well to mention that, notwithstanding the severe censure with which the old principle of the pan-closet has been assailed, there are many who still insist upon its use. Messrs. Doulton have, therefore, endeavoured, in the No. 10 pan-closet, to make it as efficient as possible. They have substituted a stoneware container, in lieu of cast-iron, used hitherto, thus avoiding corrosion and furring-up. The container is likewise provided with a ventilating socket at its highest point, so as to carry off any sewer-air which, under the ordinary circumstances, would accumulate, and eventually find its way into the house.

SUMMER DIARRHŒA IN THE LARGE TOWNS OF ENGLAND IN 1880.*

By G. B. LONGSTAFF, M.A., M.B., Cert. San. Sci. Oxon.

IN February of the past year I made a communication to this Society on the subject of summer diarrhœa. (See SANITARY RECORD, March 15, 1880.) No pretence of extensive clinical acquaintance with the disease was alleged, the materials for the paper being entirely derived from the returns of the Registrar-General, and the inquiry was, therefore, limited to fatal cases. An attempt was made to establish certain general facts, which any complete theory of the disease must account for, viz.:—

A. A variety of causes produce throughout the year deaths which are registered as due to diarrhœa. These causes affect persons at all ages, and are active in all places in such a way that the diarrhœa death-rate in the first quarter of the year is nearly the same in town and country, and not remarkably excessive in any individual town.

B. There exists in addition a specific form of diarrhœa which makes its appearance in the summer months, disappearing again with the advent of cold weather; this disease, which may be termed *Summer Diarrhœa*, kills persons of all periods of life, but in much larger numbers at the extremes of life, and in by far the greatest proportion during the first two years. It is greatly affected by the warmth or coolness of the season, and to a less extent by its dryness or wetness; but this relationship is such as to make it probable that high temperature and drought are only secondary causes in its production, a probability which is greatly strengthened by its remarkable geographical distribution. Thus, as a general, rule it is a disease of towns—but different towns are very differently affected—Hull, Leeds, Salford, Preston, Wigan, and notoriously Leicester, suffer in a remarkable degree, whereas Dover, Halifax, Swansea, and especially Merthyr Tydfil, enjoy a no less remarkable immunity.

C. As a provisional hypothesis it was suggested that some products or concomitants of putrefaction are the exciting cause of summer diarrhœa. That these are probably chiefly taken into the system through the lungs, and that the distribution of the disease is connected with the existence in certain towns, and parts of towns, of sewers with but little fall and insufficiently flushed.

I propose this evening to consider shortly the prevalence of fatal diarrhœa in England and Wales during the past summer.

The summer of 1880 was a warm one; in August and September the mean temperature was above the average—remarkably so in the latter month. The highest temperature of the year was recorded in most places as late as September 4th. The rainfall of July and September was excessive; but from August 8th—September 6th scarcely any rain fell.

The death-rate from diarrhœa in England and Wales for the three months, July, August, and September, 1880, was 3.32—a little over 21,000 persons, mostly infants, having perished from this cause alone during the above period. This death-rate exceeds the average of the previous ten years by nearly fifty per cent., and since 1847 has only been exceeded once, viz., in 1868.

* Read before the Society of Medical Officers of Health, January 21st, 1881.

Newcastle, London (never so low before), Barrow, Colchester, Oxford, Dudley, Bristol, Rochdale, and Huddersfield.

To take in the case of any individual town its average death-rate for a period of ten or more years, and compare this with the like average for other towns, does not give all the information that the figures are capable of giving. Again, to quote in the case of the same town, the death-rates in a series of successive summers is most deceptive, since it may lead to the inference that diarrhœa is on the decrease or the reverse in the district. It is necessary to have a standard for each year. The best available standard is the death-rate of the whole country during the same period. I classify the towns in each year in seven classes, according to the ratio that their death-rate from summer diarrhœa bears to that of England and Wales. In this way any one town is readily compared with any other, and we obtain such curious results as this, viz., that whereas Salford, with certain fluctuations, maintains its average place in the lists thus formed, Manchester, on the other hand, is slowly improving. A thorough investigation of the causes of this fact by their Medical Officers of Health, with all their local knowledge, might be expected to throw much light on the comparative utility of the various methods by which the Sanitary Authorities of those important centres of population are striving in a most praiseworthy manner to remedy the filth nuisances, for which Lancashire is famous in sanitary literature.

In like manner Newcastle and Gateshead appear to be sometimes very differently affected by what must be very similar, if not identical, meteorological conditions. Why is this? Plymouth and Devonport give independently varying death-rates, while during the six years that East Stonehouse was ranked among the 'fifty towns', its death-rate was distinct from either. On the other hand, during the same six years, Gosport and Portsmouth figures were more in harmony.

The case of Manchester and Salford may be also looked at in another way. For the four years 1870-3, the average rate in both towns was 7.2; in the seven years, 1874-80, the death-rate in Manchester has averaged only 3.8, whereas that of Salford was 5.4. The figures, however, as illustrated, might lead us to imagine that the Salford rate was diminishing, but this deceptive appearance is owing to the very low mortality from diarrhœa throughout the whole country during the cold and wet summers of 1877 and 1879.

When the past eleven years are compared together, after making all possible allowance for the great fluctuations which the death-rates of many of the towns exhibit, it will be found that in the following sixteen towns there is a tendency to a decrease in the death-rate from diarrhœa in the summer quarter, viz.:—Wigan, Bolton, Manchester, Sheffield, amongst the worst towns; South Shields, Bradford, Bury, Colchester, Gateshead, Middlesborough, Carlisle, Oldham, amongst the medium towns; Rochdale, Huddersfield, Chester, Chatham, amongst the healthier towns.

On the other hand, the summer diarrhœa death-rate appears to be on the increase in eight towns of the medium class, viz.:—St. Helen's, Lincoln, Ipswich, York, Worcester, Cambridge, Plymouth, Maidstone, and also in one of the healthier class, viz., Dover. In the remaining forty-five towns the mortality, though subject to great fluctuations, in some cases does not show any decided tendency to either increase or decrease.

Some counties enjoy comparative immunity, viz., Wilts, Westmoreland, Monmouth, and North and South Wales, whereas others suffer severely, viz., Warwick, Lancashire, East Riding of Yorkshire, and Leicestershire. Certain points in the distribution of the disease during the past year call for special comment, and for convenience I may state that the following remarks are confined to the facts of the eleven years 1870-80.

The death-rate in the 'twenty large towns', which has hitherto averaged nearly 69 per cent. in excess of the death-rate of England and Wales, was in 1880 but 33 per cent. above the latter, the smallest excess in any previous year being 50 per cent. in 1878. On the other hand the death-rate of the 'fifty other towns' is somewhat above the average, so that for the first time it slightly exceeded that of the 'twenty large towns'.

The mortality in the country districts was in 1880 24 per cent. below that of England and Wales, or proportionately slightly greater than in any previous year, so that on the whole diarrhœa seems to have been more general than usual in the past summer. Perhaps this is what we should expect, since small towns are growing up in the so-called country districts, whereas the sanitary administration of the large towns is improving.

When, however, the separate towns are examined, we find Preston heading the list with a death-rate of 13.6, which is greater than any that has prevailed during the past eleven years in any of the seventy towns, the nearest approach to such a high rate being 12.4 in Wigan in 1870. Preston has had the distinction of heading the list for the last two years; it has also on three occasions stood second, and for the ten years has averaged third. Second in the past year comes Leicester with the very high rate of 10.6. Leicester has seven times headed the list and been twice second—in the average of the ten years it has stood *facile princeps*. Third comes Stockport with the high rate of 10.0. Stockport has never enjoyed a low death-rate from diarrhœa, but has never before been so undesirably distinguished (average 16th). York comes out 4th with a rate of 8.6; it has never suffered so much before, and indeed there is reason to fear that diarrhœa is on the increase in that ancient city, its average place being 29th. 5th comes Salford, one place below its average. 6th stands Coventry—average 28th—but very variable throughout, having ranged from 11th to 56th. 7th comes Ipswich—average 24th, but ranging from 6th (1878) to 64th (1870). Diarrhœa seems to be increasing in this town. 8th stands Hull, two places below its average.

The eight towns at the other extremity of the list were in 1880 Bristol, Rochdale, Huddersfield, Bath, Newport, Halifax, Swansea, Merthyr. Of these Bristol, Rochdale, and Huddersfield were all even more free from diarrhœa than usual. Halifax, Swansea, and Merthyr occupied their usual places, but it is remarkable that the very small mortality in Halifax and Merthyr from this disease continues to decrease.

In the summer of 1880 sixteen towns stood much higher in the list, *i.e.*, suffered much more from diarrhœa than usual, viz.:—Stockport, York, Coventry, Ipswich, Blackburn, Walsall, Stoke-upon-Trent, Cambridge, Reading, Maidstone, Plymouth, Southampton, Cheltenham, Dover, Hastings, and Chatham.

On the other hand, seventeen towns stood much lower in the list than usual, that is enjoyed greater immunity—Wigan, Birmingham, Leeds, Yarmouth, Liverpool, Manchester, Bradford, South Shields,

Unfortunately in only eleven out of the twenty large towns is it possible to compare the diarrhœa mortality in the past summer with the meteorological conditions prevailing locally at the time. In the case of these eleven towns, such a comparison fails to connect the fatality from the disease as closely with the temperature as might be expected—though the connection is sufficiently close to prove—as, indeed, all admit, that high temperature is a necessary factor in the causation of the disease. The mean temperature of the air was 60°, or higher, in London for no less than ten weeks during the four summer months, whereas in Nottingham such a mean temperature was only reached in two weeks; nevertheless Nottingham suffered proportionately more than London to the extent of 60 per cent. The highest weekly mean temperatures were reached in London and Sunderland, both in the first week of September. In Sunderland, the diarrhœa deaths reached their highest point in that week, but in London the deaths were only one-fourth as numerous in proportion to population, and the highest point of the epidemic had been reached a month earlier.

Mean temperatures of 60° or higher occurred during June in seven out of the eleven towns, but in no case were they accompanied or immediately followed by numerous deaths from diarrhœa. A fact long ago noted, and which is easy of explanation on the theory that the disease is excited not by the direct action of high temperature upon the nervous system, but by the products of putrefaction which are dependent upon prolonged high temperature, whereas common experience teaches that these early high temperatures are most effective in causing lassitude and exhaustion. In nine out of the eleven towns, the highest mean temperature was registered in the first week of September. The highest point of the epidemic was before that week in four of these nine towns.

It is a remarkable fact that although August was hotter and more free from rain than July in London and Brighton, in both towns diarrhœa deaths diminished in frequency as the month approached its end, in spite of rising thermometer and rainless sky.

The incidence of summer diarrhœa from week to week in the past summer no more admits of explanation by meteorological conditions alone, than does its distribution in different parts of the country. To explain the course of the annually recurring epidemic in any particular year in any one district, it is requisite that besides meteorological conditions we should also be acquainted with other factors, amongst which are variations in quantity and quality of water-supply, flushing and disinfecting of sewers, street watering and scavenging, removal of house refuse.

In the last week of July the diarrhœa rate in the 'queen of watering places', Brighton, rose to 10.2 per thousand, a rate double that of any others of the great towns in the same week. What did the frightened inhabitants, or their Sanitary Officers, do in Brighton, that made the death-rate fall from that time, while in most towns it was rising? Or what had they permitted to be done previous to the end of July, that made such a state of things possible?

The epidemic in London reached its height as usual in the first week of August. Why was it almost entirely unaffected by the high temperature in September. Bristol as usual suffered but little, and that little chiefly in September; the maximum being in the fourth week of that month, or eight weeks later than in Brighton. The incidence of rainfall in the

eleven towns was not sufficiently different to account for these discrepancies.

The events of 1880 I regard as confirmatory, so far as they go, of the theory which regards the exciting cause of diarrhœa as an organism, or other concomitant of decomposition of organic matter which can only exist, or become virulent in its properties, after prolonged high temperature. One writer on the subject has recently attributed much of the mortality from summer diarrhœa to decomposing food, especially fish, and more especially mackerel. This may no doubt kill a certain number of individuals, but if it is an important factor in the mortality of infants in the first two years of life, it must act through the maternal organism. Is it or is it not the case that the mothers of infants dying from summer diarrhœa usually themselves have the disease, and if so, in which generation does it show itself first? Dr. A. McCook Weir of Nottingham, in the SANITARY RECORD for Jan. 15, 1881, admits one of my points, viz., that the disease affects persons at *all ages of life*, but he denies the influence of sanitary surroundings. He says a fatal issue only results where there is a previous *atrophic condition*. This is very probable; but as he also admits that persons not in an *atrophic state of system* take the disease readily, it merely proves that atrophy is a part of the cause of *death*, not of the *disease*. Is it not more than probable that the crippled child of three years old, who had heen 'crawling on the pavement under a broil-

23 UNHEALTHY TOWNS.	Diarrhœa Death-Rate, 3rd Quarter, 1880.	Birth-Rate, 1st Six Months, 1880.	Ratio of II to I per cent.	25 MEDIUM TOWNS.	Diarrhœa Death-Rate, 3rd Quarter, 1880.	Birth-Rate, 1st Six Months, 1880.	Ratio of II to I per cent.	22 HEALTHY TOWNS.	Diarrhœa Death-Rate, 3rd Quarter, 1880.	Birth-Rate, 1st Six Months, 1880.	Ratio of II to I per cent.
	I.	II.			I.	II.			I.	II.	
Preston	13.6	41.7	33	Nottingham	5.3	38.0	14	London	3.3	37.4	9
Leicester	10.6	38.4	28	*Sunderland*	5.0	39.7	13	Oldham	3.3	34.7	10
Stockport	10.0	41.2	24	Manchester	4.9	37.5	13	Hastings	3.3	29.4	11
York	8.6	34.6	25	Worcester	4.8	30.2	16	*Barrow*	3.3	43.5	8
Salford	8.4	40.2	21	Cambridge	4.7	32.5	14	Chatham	3.2	31.6	10
Coventry	8.3	35.3	20	Tynemouth	4.7	38.2	12	Colchester	3.2	32.9	10
Ipswich	8.2	35.6	23	Wolverhampton	4.6	38.2	12	Devonport	3.2	29.4	11
Hull	7.8	39.5	20	Reading	4.4	37.5	12	Oxford	3.1	35.2	9
Northampton	7.7	38.3	20	*Derby*	4.4	39.4	11	*West Bromwich*	3.1	45.8	7
St. Helens	7.1	48.9	15	*Bury*	4.4	41.3	11	Macclesfield	3.1	34.0	9
Wigan	7.1	48.5	15	Brighton	4.3	31.8	14	Chester	3.1	33.7	9
Ashton	7.1	41.6	17	Bradford	4.2	32.2	13	Birkenhead	2.9	37.9	8
Norwich	6.8	35.8	19	Maidstone	4.2	34.4	12	*Dudley*	2.8	39.0	7
Blackburn	6.8	38.5	18	*Gateshead*	4.2	38.9	11	Shrewsbury	2.5	33.8	7
Bolton	6.5	36.4	18	Middlesborough	3.9	35.6	11	Bristol	2.4	35.3	7
Walsall	6.2	40.5	15	Portsmouth	3.8	32.7	12	Rochdale	2.3	29.9	8
Sheffield	6.2	36.0	17	Plymouth	3.7	32.5	11	Huddersfield	2.2	30.9	7
Birmingham	6.1	41.2	15	Southampton	3.6	33.7	11	Bath	2.1	26.0	8
Leeds	6.1	36.7	17	Cheltenham	3.6	26.6	14	Newport	1.7	37.8	4
Yarmouth	6.1	33.1	18	South Shields	3.6	35.3	10	Halifax	1.4	29.6	5
Stoke	6.1	38.1	16	*Carlisle*	3.6	41.8	9	*Swansea*	.5	40.4	1
Lincoln	6.1	40.1	15	Newcastle	3.5	36.6	10	Merthyr	.4	30.4	1
Liverpool	6.0	39.7	15	Exeter	3.5	33.5	10				
				Cardiff	3.5	40.4	9				
				Dover	3.4	32.2	11				
Averages	7.5	39.1	19		4.2	35.6	12		2.6	34.5	8
				ENGLAND AND WALES	3.3	35.8	9				

Towns in *italics* have a birth-rate higher than Leicester.

ing sun', and afterwards died of English cholera eight hours after the first symptoms, had been as children often do, playing immediately over a sewer grating? Again, Dr. McCook Weir says (SANITARY RECORD, Sept. 1879, p. 91), 'Dr. Johnson is well aware that infantile mortality must to a great extent, other things being equal, depend on the number of infants', and again, in the same paper, 'given, therefore, a uniform birth-rate, an equal degree of infant susceptibility, whether congenital or acquired, or both, and an equal degree of heat, and I venture to submit that there would be an equal prevalence of infantile summer diarrhœa throughout the country.'

To test the importance of birth rate in the question, I have for each of the seventy towns, calculated the ratio per cent. of the diarrhœa deaths in the summer quarters to the mean birth-rate of the two preceding quarters, whereby all errors of estimation of population are avoided, this being in fact but another way of stating the percentage of diarrhœa deaths to births registered in an equal period of time.

Now it is evident that if a high birth-rate were an important factor in the question, these ratios should be approximately equal for all the towns. What is the case, however? Preston gives the highest ratio, 33 per cent. The nine towns with the highest diarrhœa rates give an average ratio of 24 per cent. Whereas the nine towns with lowest diarrhœa rates give an average ratio of five per cent, Swansea and Merthyr having a ratio of 1 per cent only.

In the accompanying table all the towns having a higher birth-rate than Leicester are in italics. I agree with Dr. Weir that *magna est veritas*, but doubt whether it *prævalebit* yet awhile unless the promised Government enquiry is far more successful than previous enquiries have been. At the same time, I cannot but feel that induction from an insufficient basis (but one or two towns being considered by each enquirer) has been the chief source of error hitherto.

Mr. G. E. Waring has been commissioned by the United States National Board of Health to conduct a series of practical experiments as to the influence of the flow of water through pipes, on the syphoning of traps, and on the action of various flushing devices and junction pieces. He has accordingly invited inventors to send in glass models of full working size — nothing larger than 4 in. in diameter. After the trial, these models will become the property of the National Board of Health. The result of the trial, whether favourable or unfavourable, will be published in full.

SANITAS OIL: ITS NATURE AND PROPERTIES.

By C. T. KINGZETT, F.I.C., F.C.S.

IN the manufacture of the aqueous solution known in commerce as Sanitas (which is characterised by the presence of peroxide of hydrogen and certain camphoraceous substances), there is also obtained another product, which I have named 'Sanitas Oil'. For the purpose of understanding how this is produced, it will be well to state here that the primary manufacturing operation consists in forcing warm air through a hot mixture of turpentine and water. The turpentine, as charged into the oxidisers, has an average density of about 867; but, as it undergoes oxidation this density gradually increases, the increase being due, of course, to the absorption of oxygen from the air used.

Among the products of this oxidation is a peroxidised substance (probably camphoric peroxide $C_{10}H_{14}O_4$) which, by contact with water, suffers partial decomposition, and gives rise to the formation of peroxide of hydrogen (H_2O_2), which then passes into aqueous solution along with certain other substances formed in the operation. The larger part of the organic peroxide, however, remains dissolved in the oil, and is accompanied, in all probability, with a considerable amount of camphor and other undefined substances. Chemists fully appreciate the difficulty of ascertaining the complete composition of such a product as that in question. Within certain limits of operating, the longer the air is forced through the mixture, the greater is the amount of the camphoric peroxide which is obtained in the ultimate product.

The primary operation may be conducted in the absence of water, but then the oxidation proceeds less rapidly. The details observed in the practical manufacture differ according as the aqueous fluid 'Sanitas' or 'Sanitas Oil' is the chief product desired. In the latter case, there are practically employed a large number of oxidisers charged with equal volumes of water and turpentine, and maintained by means of hot-water jackets at a temperature of 60° C., the air-current being continued until the specific gravity of the oil stands at the figure desired, ranging from 950 to 975 (water being 1,000), although, if desirable, it may be obtained of a density of 1,235, or greater.

The process just briefly described appears simple enough, but in order to obtain satisfactory products a number of circumstances have to be most carefully observed, but these it is not necessary to enter upon here. It is enough to recognise that the process consists in the separation, by volatilisation, of the more volatile (and less oxidisible) part of the hydrocarbon, while the residual part gradually absorbs an enormous quantity of oxygen, and constitutes what is termed 'Sanitas Oil'.*

For the purpose of describing its further properties, we will assume that the operation ceases when the density of the oil is 950 or thereabouts. In such case it is no longer colourless like the original turpentine, but is of a deep golden brown colour, and exhibits a powerful and penetrating odour of camphor, being also suggestive of peppermint. If it be now subjected to dry distillation, a considerable yield is obtained between 120° C. and 140° C., but as the distillation proceeds, water also comes over, suggesting that the oil suffers some decomposition under these circumstances, as might be expected from chemical considerations. If continued for some time, the mass left in the retort sets, after cooling, into a more or less hard, black pitch-like substance.

Working under conditions now being observed, the yield of 'Sanitas Oil' in any one operation, calculated upon the original turpentine employed, amounts to from 30 to 40 per cent. (by volume). The amount of oxygen fixed, so to say, in the oil may be roughly estimated by determining the average density of the 'Sanitas Oil', and multiplying the difference between this and that of the original turpentine by the number of gallons produced. For instance, suppose we have 1,000 gallons of 'Sanitas Oil' with a density of 950, and say the turpentine at the start had a density of 865; the difference is 85, indicating roughly a gain of 0.85 lb. of oxygen to each gallon, and therefore of 850 lbs. to the 1,000 gallons. Now, as already stated, some of this oxygen, in all probability, exists in the form of camphor, and otherwise; but most of it is present in the form of the organic peroxide, which by contact with water, forms peroxide of hydrogen. Indeed, instead of regarding the fixation of oxygen in the 1,000 gallons of oil as amounting to 850 lbs., we must really look to a figure sufficiently large to comprehend all the peroxide of hydrogen which has been likewise produced in any such operation, and this would, reasoning from certain actual manufacturing operations, raise the oxygen fixed by about 150 lbs.

The sanitary value of 'Sanitas Oil' can be determined by at least three methods, intended respectively to ascertain (1) its power of oxidation, (2) its antiseptic properties, (3) its germicidal properties. I have confined myself to the first two methods, but, as a matter of fact, these cover the third to a large extent.

First, then, as to the power of oxidation. It is well known to chemists that turpentine, pure and simple, has no action upon acidified iodide of potassium; but so soon as it has absorbed oxygen from the air, or from pure oxygen, or has been subjected to the action of ozone,* it is competent to decompose potassium iodide, setting free the iodine, by the estimation of which the oxidising power can be determined, just as in the case of peroxide of hydrogen or ozone itself, although less readily; less readily, because turpentine and 'Sanitas Oil' are not miscible with, or largely soluble in, water. In consequence, when estimating the camphoric peroxide present in our product, it is found that immediately the oil comes in contact with the acidified solution containing excess of potassic iodide, some iodine is liberated, and this may be at once estimated by titration with decinormal sodic thiosulphate; but the reaction is not yet complete, and from time to time, upon due agitation, so as to bring all parts of the 'Sanitas Oil' into intimate contact with the reagents, further quantities of iodine will be set free and must be determined accordingly, only stopping when no more iodine is liberated after a reasonable period of agitation.

* The constitution of the various commercial turpentines is a matter which has received a large amount of attention from the author, and it is still under study. It is customary to speak of turpentine as a hydrocarbon of a simple nature, but as a matter of fact, Russian turpentine, particularly, contains two or more distinct hydrocarbons; distinct, that is to say, in a molecular sense, if not otherwise. Isomerism may or may not explain the facts which I hope to publish at a future time.

* See my Report on the Atmospheric Oxidation of Phosphorus, in *Journ. Chem. Soc.* December 1880, where the action of ozone upon turpentine is described and explained. In all probability the total oxidising effects of 'Sanitas Oil' are exerted in two stages, the first of which consists in the generation of peroxide of hydrogen. This can be experimentally demonstrated.

The gradual formation of the peroxide in the 'Sanitas Oil' may be thus registered, and for the purpose of illustration I may give here the notes of a recent operation.

At the start 100 c.c. of the turpentine (sp. gr. 867) liberated iodine requiring 10 c.c. of the standard thiosulphate.

				Thiosulphate.
When the density was	875	then 100 c.c. required	more than	50 c.c.
,, ,,	880	,, ,,	,,	80 ,,
,, ,,	885	,, ,,	,,	144 ,,
,, ,,	910	,, ,,	,,	600 ,,
,, ,,	975	,, ,,	,,	1000 ,,

This result signifies that at the time when the operation was concluded, the oxidising power of the product was such that 100 c.c. could decompose 16.6 grms. of potassic iodide, and consequently liberate 12.7 grms. of iodine. In other words, the oxidising power was such that, assuming the active oxygen could be obtained in the gaseous state, one gallon of the 'Sanitas Oil' would give twenty-five litres, or between five and six gallons, of that gas.

Now, it is hardly necessary to point out that a substance which will oxidise such a stable compound as iodide of potassium will also oxidise any animal or vegetable substances, particularly if these same substances be in course of putrefactive decomposition, and thus complete that process in a short time, which under the preliminary action of bacteria and the completing action of infusoria would take an enormously greater time, and in the meanwhile afford a midus for various *viri*, or be at least unwholesome. Not merely does 'Sanitas Oil' exhibit this powerful oxidising effect, but what is more, after this has been exercised to the full, it is capable of forming a new amount of active peroxide, which then becomes available for further work. This is because it contains a certain amount of that particular part of the original turpentine which most easily absorbs oxygen from the air, and because the manufacturing operation by which it has been produced has furnished it with a sort of enhanced power to assimilate oxygen in this way.

In treating of the antiseptic properties of 'Sanitas Oil' I shall be very brief, because the description of a few experiments will serve the purpose equally well as by detailing a much larger number.

Experiment 1.—A piece of beef, weighing 20 grms., was suspended in 100 c.c. of water containing 0.5 c.c. of 'Sanitas Oil'. It remained sweet for at least twenty-five days, the solution being then colourless. When 1 c.c. of 'Sanitas Oil' was employed, the experiment was continued for forty days, and the beef was then still sweet. In the absence of 'Sanitas Oil' a third piece of beef, placed under otherwise corresponding circumstances, became putrid on the third day, the solution becoming red and most offensive.

Experiment 2.—A quantity of fresh flour paste was made, and three portions of 100 c.c. each were taken. To each of the first two 1 c.c. of Sanitas Oil was added; the third portion was left unprotected. The unprotected portion was stale and sour to smell after a few days, and after five days mildew appeared on the surface, and quickly increased in amount until a thick yellow-green growth was obtained. In the other cases the 'Sanitas Oil' protected the paste from all apparent decompostion during from thirty days in the one case, to fifty days in the other case.

Experiment 3.—50 c.c. of white of egg, diluted with 250 c.c. of water, and portions of 100 c.c. each taken. The unprotected portion was putrid within a week after the start, whereas the portions containing respectively 0.5 c.c. and 1 c.c. of Sanitas Oil kept unchanged as long as observed, viz., fifty days.

Experiment 4.—200 c.c. of urine, treated with one-half c.c. of 'Sanitas Oil', and agitated, remained good during the whole time observed, viz., 100 days.

Many other experiments have been made, but it is not necessary to detail them. They show that 'Sanitas Oil' is very much more powerful than the aqueous 'Sanitas' in antiseptic energy, and indeed ranks among the most energetic antiseptic solutions. In passing, it may be useful to observe that this antiseptic influence is exhibited quite apart from the power of oxidation, and signifies in all probability a germicidal power; that is to say, the 'Sanitas Oil' either kills the germ-life which initiates putrefactive and other changes, or else it effectually interferes with its normal functions.

As regards the uses of 'Sanitas Oil', a few words will suffice. This preparation is by no means intended to supersede, in any degree, the use of the aqueous solution, but only to supplement it; indeed, while it is far too powerful in its action to serve the purposes for which the aqueous solution is intended, its physico-chemical properties do not qualify it to meet the same ends. It may be employed for adding to glycerine, or oils, or ointments, when these various substances are applied to the body, either during the peeling stages of several infectious diseases, or when any suppurative action or morbid process requires to be arrested. It can also be used for producing such a powerful spray for the antiseptic treatment of wounds as is often required. Further, its evaporation forms an excellent expedient for the fumigation of apartments hitherto inhabited by persons suffering from communicable diseases. An ordinary-sized room requires about one fluid ounce of the oil, which should be placed in a small metal dish, and evaporated by means of a Bunsen lamp or other appliance beneath, taking ordinary precautions to prevent the material catching fire. Any plane surface, such as is presented by flooring and walls, may be effectually disinfected by simply smearing or wiping it over with a cloth or brush dipped in the oil, and in such operations a very minute amount of the substance goes a long way, by reason of its superior spreading qualities. The oil is slowly volatile, and hence it is competent to act as an aërial disinfectant. Although not appreciably soluble in water, it may be made into an emulsion therewith, with or without a little caustic alkali; and water thus treated can be with advantage used for watering streets in times of epidemics, and for the deodorisation of modern pavements and offensive collections of any kind. It is, of course, soluble in spirit, and readily dissolves in any oil. Sprinkled over sawdust, it forms a most effective deodorant for use in urinals and other places, where a fluid as ordinarily applied is too soon carried away from the scene of action. No doubt many other applications will occur to the minds of my readers, but enough has now been said in illustration of the oxidising and antiseptic characters of this new 'Sanitas' product. In conclusion, I trust these few particulars may prove interesting or useful to the many sanitarians who read these columns.

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap, 8d. tablets.—(Advt.)

THE ETIOLOGY OF DIPHTHERIA, &c., &c.*

By G. H. FOSBROKE, S.Sc.C. Camb.,
President of the Birmingham and Midland Association of Medical Officers of Health.

I FEEL that my first duty on taking this chair is to assure you I speak with all sincerity when I say I am deeply sensible of the compliment you have to day paid me, in electing me President of this Society for the coming year, and I trust you will accept my heartfelt thanks for the honour you have thus conferred upon me. At the same time, I may congratulate you on the position the Association has achieved, as shown by the increase of members. The success attendant upon the efforts of my predecessors, and especially of our excellent Hon. Sec., to advance the welfare of this Society is thus apparent. Still, I cannot refrain from saying that I feel assured that if each and all of us were to put our shoulders to the wheel, that many of our professional brethren who are interested in the public health administrations of the midland counties, would be induced to enlist themselves under our banner, and not only thus give us the result of their experience, but also in return receive corresponding benefits.

The past year, as we are all aware, has witnessed a political crisis, with a subsequent change of Government. I fondly hoped that after an appeal to the country, one of the first acts of the incoming party, be it Tory or Whig, would be to confer a great boon on the country at large, by creating a Minister of Health empowered to reorganise the Public Health Service. In cherishing this hope, I feel that I was joined by many of the formidable array now engaged in the administration of various existing Sanitary Acts, but, alas! how has it been realised? A question of great importance to the country at large has been mooted by some members of the present Government; I allude to the formation of County Boards (see SANITARY RECORD, June 15, 1880). This great change has been gradually coming to the front for some time past, and it behoves this and all other similar Associations to be on the alert, in order that among other benefits proposed to be conferred upon the community by such a measure, the Public Health Administration and Service may be reorganised and developed. The unsatisfactory position of the Public Health Service, as regards the uncertain tenure of office by its medical officers, is a question which is generally admitted to be one necessitating immediate reform. I would therefore counsel this Association to use all its influence for obtaining that end without further delay. If it seems probable that the forthcoming session will see a total reorganisation of the Public Health Service, then will be the time for us to act; but if, on the other hand, no such good luck is in store, then for my part I would recommend an influential deputation, or memorial to the Local Government Board on the subject. No member of this society will, I think, gainsay the advisability of making every attempt to get removed, at the earliest possible day, the injustice which Medical Officers of Health experience on being submitted to such uncertain tenure of office. Instances are recorded in nearly every medical periodical of our unsatisfactory position, and I cannot refrain from alluding to the unfair treatment which a member of our society experienced only two or three months ago. The gentleman I refer to is known to have been an officer who has discharged his duties with great zeal and ability, and when seeking re-election was quietly passed over by the majority of his board, without any apparent reason. That such treatment is still permissible is a disgrace to any Public Service, and should act as a special incentive to the members of the Association in getting such wrongs redressed. It seems to me that it is also expedient in reorganising the Public Health Service, that a definite clause should be drawn precluding the appointment of all Medical Officers of Health and Inspectors of Nuisances, who have not manifested some special qualification for discharging their duties efficiently. By this assertion I do not for one instant propose to prevent any person who has already seen service from seeking any appointment that may be vacant, but, be it understood, I propose to make such an arrangement prospective, and only to come into operation after a lapse of time. Some such requirement as this I feel to be highly essential in the case of Inspectors of Nuisances, for we are all aware when those officers are appointed it does not necessarily follow that they understand thoroughly any part of the work they undertake.

As an instance of the interest I have taken in this subject for some time past, I may adduce the fact that I persuaded two inspectors in my district to so qualify themselves by passing the examination offered by the Sanitary Institute of Great Britain. I have felt, too, for some time past, that all Inspectors of Nuisances should be the vaccination officers of their districts, for who, I would ask, are so competent to enforce vaccination as those who are constantly engaged in making every effort to limit the spread of epidemic disease.

This subject now brings me to a question in which this society has already evinced considerable interest; I allude to the importance of urging upon Government the necessity of holding a comprehensive enquiry into the present means of arresting the progress of infectious diseases, and the legislative measures required to carry further improvement into effect.

In advancing this subject so soon after the discussion that the Association held upon it last year, some apology is due from me, but I must plead as my excuse that since the question was last mooted by this society, a new administration has come into office. I feel, too, that it is by constantly airing the imperfections of the Public Health Act that remedial measures alone can be obtained.

For some years past three Sanitary Authorities of my district have agreed with the medical men practising within the areas of their jurisdiction to report for a small fee all cases of small-pox, scarlatina, fever, and diphtheria, which come to their knowledge, and I can testify to the excellent results consequent upon these arrangements. I am quite sure that these agreements have been scrupulously fulfilled, and I may add no difficulties have arisen in carrying them out. It may, and I know it has been alleged that where sanitary authorities have not provided themselves with means of isolating infectious diseases, that to insist on the early notification of such cases would only be piecemeal legislation. In this I concur, but at the same time I contend that when it is known that a dangerous zymotic disorder exists in this or that locality, that preventive measures are more generally and

* Inaugural Addtess delivered at the Sixth Annual Meeting of the Birmingham and Midland Association of Medical Officers of Health, January 6th, 1881.

willingly adopted. The great reason why most Sanitary Authorities have not erected fever hospitals, is of course on the plea of 'expense'. From personal experience I feel assured that the erection of such institutions at great cost is a mistake, and especially so in rural districts. I can speak unhesitatingly of the efficacy of a substantially-built and inexpensive wooden hospital, likely to be permanent for the next quarter of a century, which has been erected in my district. As corroborate evidence, I may add that no less than 357 patients have been treated therein during the last six years, and that one of them was a very near relation of my own. Before I conclude this part of my address I would refer to a subject which I think is worth State intervention. It is the inadequate power which Sanitary Authorities possess over slaughter-houses. In spite of the stringent bye-laws which often exist for regulating their well ordering, such places, when situated, as is so often the case, in densely populated neighbourhoods, occasionally become intolerable nuisances; the only remedy for which is the removal of those trade processes to a more appropriate spot. As the law now stands, a Sanitary Authority may have provided a public 'abattoir' and still cannot oblige butchers to slaughter therein, even if their trade would be in no way interfered with by doing so. I would therefore submit to this Association that it is expedient for Sanitary Authorities to be armed with power for compelling butchers to slaughter at public 'abattoirs' when it is evident that the health of any community necessitates such a proceeding. I shall now venture to offer a few remarks on a 'questio vexata', I mean the etiology of diphtheria. I candidly confess that after the excellent paper Dr. Thursfield read before this society, some two and a half years ago (see SANITARY RECORD Sept. 6, 1878), I approach my subject with great diffidence. As, however, during the past few years, it has fallen to my lot to witness several serious outbreaks of diphtheria, and as the conclusions I have arrived at differ somewhat from those of many competent observers, I cannot refrain from taking this opportunity of expressing my opinion upon some points associated with the origin and distribution of the disease. At the outset I wish it clearly to be understood that, 'I lay not the flattering unction to my soul' that I am about to attempt anything like a complete etiological sketch of the disorder, and that my somewhat extended opportunities of studying its prevention and propagation alone induce me to offer any opinion on the subject.

In ordinary occurences of epidemic disease the facts to be taken into account are so numerous, and consequently the difficulty of arriving at the truth about them so great, that, even with the most carefully conducted enquiries, the results arrived at may generally be freely and justifiably criticised. My object will be attained if I can be the means of eliciting from the members of this Association some of their practical experiences of diphtheria; for no professional man can, I think, be found who will not unhesitatingly allow that much has yet to be learnt about its cause or causes, and principal channels of propagation. The term 'diphtheria' has hitherto been somewhat loosely used, I think, therefore, that it is advisable to state what disease I am about to refer to. Dr. Thursfield, in his admirable monograph which I have referred to, appears to me to have given a very lucid definition of the term; I shall therefore quote that author verbatim. 'Diphtheria,' he says, 'is a systemic contagious disease characterised by a tendency to membranous exudation, chiefly affecting the pharynx, and having these peculiarities, that during its course albumen is frequently present in the urine, and recovery is peculiarly liable to be followed by various forms of local paralysis.' The same author adds to this definition the words 'or any sore throat of an infectious nature', excluding, of course, those in which, as in syphilis and scarlatina, severe throat affections are merely local symptoms of an otherwise well recognised contagious disease.

Such, then, it appears to me, is a well thought out description of the term diphtheria. Having now specially confined my observations to the disease from a preventive medicine point of view, I shall not attempt to discuss its identity or non-identity with croup, the nature of the diphtheritic membrane, its treatment, or several other points more especially of peculiar interest to the physician. It is, I think, an undoubted fact that diphtheria has long been known, but that its history consists of a series of apparently disconnected outbreaks. Its occurrence in the days of Aretæus, during the sixteenth and seventeenth centuries, and its prevalence in England in 1855, prove that the disease is not a new one. Neither was it described under the name diphtheria until Bretonneau introduced the term in 1818, nor did the Registrar-General in his official returns recognise it as such before 1855. Since 1857 the disease has been more or less prevalent in this country, and its special features have been very carefully studied during the last ten years. My object in alluding thus briefly to its history will, I trust, shortly be obvious.

As I have previously stated, the remarks I am about to make will be based on personal experience, so a very brief description of the district where I have made my observations may not be out of place. The district in question is a circumscribed area of 180,000 statute acres, with a population of about 60,000 (of which about 20,000 are urban), and lies in the counties of Warwick, Worcester, and Gloucester. The surface of this locality is gently undulating, the chief range of hills, lying on its eastern border, are the northern branch of the Cotswold and Edge Hills. The only river intersecting the district is the Avon, with its tributaries the Arrow and Stour. Geologically considered, the Keüper sandstone predominates; but a considerable area is on the lower lias. In some few parishes on the eastern border marlstone, upper lias, clay, and inferior oolite crop up. Agriculture is the principal employment of the majority of the population, but needle manufacture forms the staple trade of several hundred hands. The urban portions of the district are few, one town of 10,000 population, and a second of 5,000, are the chief urban centres. This very imperfect description of the neighbourhood where I have lately witnessed much diphtheria will enable you to form some estimate of my opportunities of forming a correct or erroneous opinion of the nature of this obscure disease.

As regards the question of 'site', my experience, as one would naturally expect, confirms the already well established fact that diphtheria is more common in rural than urban dtstricts. In the principal urban centre (population 10,000), with which I am officially connected, the disease is almost unknown, but in one town of 5,000 inhabitants, solitary but well-marked cases have come to my knowledge. A fact upon which I wish to lay some stress is, that when these outbreaks have occurred in the latter town, they prevailed concurrently with either typhoid

fever or scarlatina; the preference generally being for the former disease. It appears to me, without jumping to any conclusion too hastily, that there is substantial evidence for thinking that the same poison which originates typhoid fever often causes diphtheria. On more than one occasion I have met with typhoid fever in one household, and diphtheria concurrently in an adjacent one, both families living under precisely similar sanitary conditions, even as regards water-supply (which was polluted and undoubtedly produced the fever). Again, the concomitant appearance of scarlatina and diphtheria seems to show that these diseases are nearly allied. Although I have, on several occasions, known diphtheria to appear in urban districts, and associated as I have just mentioned, still I have never found that it has then shown any tendency to become epidemic. Further, when it has prevailed extensively in a rural district, and has thence been conveyed into a neighbouring town, I have not found that even then it has extended. This, among other reasons, induces me to conclude that not only is diphtheria comparatively more rare in urban than rural districts, but that it does not show the tendency to spread in towns (even when fairly introduced) that it does in the country.

I believe the experience derived from Birmingham is exceptional, and at variance with this conclusion; for as Dr. Thursfield has shown, that borough ranks with healthy country districts in fever mortality, but has a mortality from diphtheria far exceeding that of any other large town.

Passing on to the geological aspect of the etiology of diphtheria, I have not observed that the incidence of disease has been specially marked on any particular 'formation'. Certainly, in my own case, it appeared more frequently on the Keüper marl; but then you will remember the larger part of my field of observation so lies. Dr. Kelly, the esteemed Medical Officer of Health for West Sussex, in his sixth annual report, when commenting on this subject, writes: 'A comparison of soil seems to show that it (diphtheria) is far more frequent on the Weald clay than elsewhere, and next upon the upper green sand'. Dr. Thursfield, too, in his admirable paper to which I have so frequently alluded, traces 'the closest connexion between dampness of sub-soil and the disease'. These experiences, too, I am aware are backed by that of many other eminent observers, who have found that most of the places visited were either damp, low-lying, or clayey. It has also been noticed that stagnation of air from numbers of trees adjoining diphtheria-infected dwellings, in addition to dampness of site, tend to promote the disease. In my experience, dampness of site does not bear that intimate relationship to diphtheria that many persons are prone to believe, and, as I have already shown in this respect, my conclusion disagrees with that of many observers. All my attempts to associate the origin and distribution of this disease with any peculiar soil, or situation, have failed, for I have met with it at villages in elevated and airy situations, and in low-lying localities. I candidly admit that two serious visitations came under my notice in low-lying places where there was not sufficient fall to get rid of the surface water, and that a third outbreak I investigated occurred at a hamlet situated on upland clay. But the most serious epidemics, in fact the larger number of cases with which I have been personally connected, have appeared on soils that were not of a tenacious character, but rather gravelly and naturally well-drained. With one exception, my experience directly opposes the idea that houses shut in by trees are more liable to harbour diphtheria than those not surrounded by superabundant vegetation. But few dwellings I visited on diphtheritic researches were erected against banks of earth. The exceptional outbreak I have just referred to occurred at a small agricultural hamlet situated on upland clay, and although fairly elevated was shut in on two sides by hills. This is the only striking instance which I have met with which at all corroborates the view that dampness of site directly influences diphtheria. It is only right, too, to state that almost every insanitary condition that was possible existed in the village; and, further, that since a wholesome water-supply (to the want of which the disease was traced) has been in use, the disease has not re-appeared, although an interval of six years has elapsed since this improvement was effected. In short, after carefully looking over my notes, I am led to the conclusion that the capricious visitations of this disease are not explained either by depression and moisture in soil, or elevation and dryness of site.

How closely the origin and distribution of diphtheria is connected with meteorological conditions has been discussed again and again, and on this point, too, there is a diversity of opinion. In my sixth annual report, I wrote 'that the *dissemination* of diphtheria is not dependent upon season'. In a critique upon this and other observations in one of the leading medical periodicals, the writer remarks that 'I am at variance with general opinion, for undoubtedly it is in the autumn that diphtheria is most prevalent'. I am afraid that in framing a syllabus of my experiences, I was not sufficiently careful in wording this conclusion, for it was not my intention that such an interpretation should be permissible, although I admit that the construction put upon my words was justifiable. In saying that the dissemination of diphtheria was not dependent on season, I meant to aver that when the disease had steadily raged in any locality through the whole year, as is sometimes the case, that its fluctuations do not appear to be influenced by 'season'. Some little time back Dr. Hubert Airy of the Local Government Board, when writing to me on the nature of diphtheria, called my attention to the coincidence that the disease on first appearing in any locality manifests a preference for doing so in October, rather than any other month.

After searching my records of all the earliest appearances of the different cases I have witnessed, I find that my experience corroborates Dr. Airy's. When once fairly introduced for the first time, or at any rate after an almost indefinite interval, among a susceptible community, originating in October it would naturally increase as an epidemic in early winter.

I am aware that the mortality from diphtheria for the country at large is greater in winter than summer; but what I contend is, that the fluctuations in its dissemination, where it exists for protracted periods, do not appear to be influenced by any particular weather, be it wet or fine, hot or cold. For several years past I have daily recorded meteorological observations made by aid of the maximum and minimum thermometers, hydrometer, barometer, and rain gauge, and still I have not noticed that excessive rain-fall has any material influence on the disease. Observations made in Southern Russia, if such are reliable, seem to favour the idea that the driest months tend to develope the diphtheritic

poison, while cold and wet weather intensify its virulence. The meteorological observations I made during one outbreak differed so widely from those taken concurrently with others, that at present I can form no opinion of their influence (if any such exists) on diphtheria. Why the first cases of an epidemic apparently manifest a preference for October, is a problem I have not yet been able to solve. One meteorological condition I have hitherto not spoken of is that of wind. Without having omitted to observe this agent, I may say that I have failed to ascertain what its influence, if any, may be.

(*To be continued.*)

ADVANCES MADE IN CREMATION.

THIS reform in the matter of dealing with our bodies after death has lately made great progress throughout the whole of Europe, and there remains but little doubt that temples for the performance of this revived rite will speedily find a site in the cemeteries of every great city. The first of these structures was raised at Milan in 1875, and in this town many scores of cremations have since taken place; the second one was erected at Gotha in 1878, and taken over by the city authorities, so that burial or cremation is optional with any citizen. These temples are provided with columbaria for the storage of the urns, and are picturesque additions to the cemeteries in which they are placed. The third furnace erected was that raised in the grounds of the Cremation Society of England at Woking, but up to the present no human cremation has taken place there. This is not owing to any prohibition on the side of Law, as the Government authorities have admitted; but because the Council of the Society wish to act in harmony with the Government, and to receive their expressed sanction. This sanction would afford a recognition of the new rite in so properly a constructed apparatus as the one at Woking, and would yet lay proper restrictions upon the use of improper furnaces in other towns seeking to follow this example. The Society is now in correspondence with the Government on this matter.

There are numerous cremation societies in Europe, but it would serve no purpose to schedule them. Perhaps the most complete one is that of Holland. Within the last few weeks, a society for the propagation of cremation has been founded in France, and the list of members of the committee includes some of the most distinguished men in that country. The society is determined to succeed, and have limited the subscription to ten francs for the first year, and five francs for subsequent ones. The published statutes are radically the same as those of the Dutch, German, Italian, and English societies.

The 'International Hygienic Congress' held its last sitting at Milan, on the 12th September 1880, and the members passed a resolution to endeavour to render it compulsory to incinerate the bodies of all animals which have died of any contagious malady, and to have set up in every parish, facilities for this purpose. There was also a special International Committee appointed, charged with the duty of drafting and presenting to the several Governments, within a year from that date, a set of practicable propositions, adapted to facilitate the accomplishment of the reform. The members of this special committee are all well known in Europe, and we append a list in case any of our readers may wish for special knowledge on the matter from any of the countries represented.

President—Dr. M. De Cristoforis.
Italy.—Dr. Gaetano Pini.
France.—Professor Emile Trélat, C.E.
Belgium.—Dr. E. Janssens.
Germany.—Dr. Ch. Marie Finkelnburg.
Holland.—Professor De Meyer von Overbeeck.
Egypt.—Abbate Bey, M.D.
Russia.—Dr. L. Fröber.
England.—W. Eassie, C.E.
Switzerland.—Dr. Louis Dunant.
Spain.—Dr. V. Crabello.
Greece.—Dr. K. Bombas.
Hungary.—Dr. Joseph Körosi.
Austria.—Professor Ch. Sigmund.
Roumania.—Dr. Felig Taboc.
Portugal.—Professor Amado Silva.

The above list will serve to shew that a very strong tide has set in in favour of cremation as opposed to burial, and it is evident that before long the rite will at all events be made a permissive or optional one, as is now the case at Milan and Gotha.

The fourth and next meeting of the 'International Hygienic Congress' will be held at Geneva in 1882, when the above-named gentlemen have promised to attend, and submit the results of their several labours.

ON THE DISSEMINATION OF INFECTIOUS DISEASE BY MILK.

BY FRANCIS T. BOND, M.D.,
Medical Officer of Health, Gloucestershire Combined Sanitary District.

Dr. THURSFIELD has sufficiently indicated in his paper, published in the last number of the SANITARY RECORD, the importance of this subject, a fact which is now so well recognised that it is unnecessary to enlarge further upon it. The object of his paper seems, however, to have been rather directed to point out some defect in the provisions which the legislature has made for preventing the dissemination of infectious disease by milk. But what that defect is, he has not made very evident; still less, so far as I can see, does he suggest any definite remedy. Now it is within the knowledge, I apprehend, of most Medical Officers of Health connected with Rural Districts, that, as Dr. Thursfield says, although Parliament is assumed to have made provision for the protection of milk from infection, milk is, in most of those districts, as open to infection still, as it was before the Animals Contagious Diseases Act, 1878, was passed. What is the reason of this? It cannot be because the Act is insufficient for the purpose, for in one county at any rate, Surrey, adequate arrangements have been made by the Court of Quarter Sessions, to ensure this object. In this county, the Court has appointed a Dairy Inspector in each petty sessional district, whose duty it is to regularly inspect the dairies in his district, and to see that the provisions of the Act are complied with. In some cases the Petty Sessions Court has arranged with the Medical Officer of Health to undertake the duties of this post, but not, I believe, in all; some Courts having appointed an Inspector who is not officially connected at all with sanitary work. Why this latter course has been adopted I do not know, unless it be that the Medical Officer of Health in such case has declined to co-operate with the Court; for it must be evident that on all grounds the Medical Officer of Health is the most suitable person for the post.

It is clear, therefore, that if milk is still open to infection in any rural district, from causes which might be prevented by the enforcement of the provisions of the Dairies Clauses, it is not because the powers given by those clauses are insufficient, but because they have not been availed of. It is, in fact, because the Court of Quarter Sessions for that district has not done its duty, by establishing a proper system of inspection. So far as I have been able to learn, this is the case with a very considerable number of counties, the county of Surrey forming a notable and creditable exception to the apathy which has been exhibited by most Quarter Sessional Courts in this direction. But there may be cases in which, though the Local Authority may not have shown apathy in this matter, the provisions of the Act may be as inoperative in its district as if they did not exist. I can give one. The Court of Quarter Sessions of the county of Gloucester, some fifteen months after the Act of 1878 had been passed, decided, in opposition to the decision of the Legislature, that the Rural Sanitary Authorities of their district, and not the Court, were the proper authorities for carrying out the Act. They then, without consulting with these Authorities or their Officers, passed a resolution appointing *each Rural Authority and its Officers an Inspector under the Act*, but made no bye-laws, gave no instructions as to how the work was to be done, and made no provision for payment for the duties thus imposed.

Such a proceeding could only bear one interpretation, viz., that it was a deliberate attempt on the part of the Court to absolve itself of the responsibility which had been imposed upon it by Parliament, and to shunt it on to the shoulders of the Rural Sanitary Authorities of its district. The Court, although in making these appointments it invited the co-operation of the several Sanitary Authorities interested, omitted altogether to pay the same compliment to the Officers of those Authorities, trusting, apparently, that the *argumentum ad crumenam*, which its Chairmain plied with great vigour, would be a sufficient inducement to these Authorities to assume a position which was wholly outside their functions, and that they would put pressure on their Officers to do the work for nothing, whether they were inclined to do so or not. Under these circumstances I felt it my duty to take up a very decided position, and to respectfully inform the Rural Authorities in my district, who paid me the compliment of consulting me in the matter, that they had no power to undertake such duties, or to give their Officers any instructions in regard to them; that I must decline to recognise them as authorised to act in the matter; and that, as a Medical Officer of Health, I should, so far as my own district is concerned, hold the Court of Quarter Sessions responsible for carrying out the Act properly, and for any results which might arise from their neglect to do so. Fortunately, no epidemic has, so far as I am aware, been traceable to contaminated milk coming from a dairy in my district since that time, but if such an accident should occur, and it should appear that it might have been prevented by a proper system of inspection, I shall know what course to take in the matter, and shall not hesitate to take it.

It has been stated that some Rural Authorities in the county have accepted the functions thus illegally imposed upon them by the Court of Quarter Sessions; but whether this be so or not, I can testify that the larger part of the county, at any rate, is without any adequate protection at all. I ought to add that after waiting for twelve months to see what the Rural Sanitary Authorities would do, and finding that they had taken no steps whatever in the matter, the Chairman wrote directly to the Medical Officers of Health of these Authorities inviting their co-operation, and asking on what terms they would give it. To that invitation I replied that I should be happy to give the Court any assistance in my power to carry out efficiently the provisions of the Act throughout its district, but I have heard nothing further on the subject.

I think, that this little history will confirm what I have before stated, viz., that if the protection of milk from infection is not more efficient in any part of the county now than it was before the passing of the Act of 1878, it is not because the Act itself is ineffective; though I by no means deny that it contains defects, or assert that it is as efficient as it might have been made. Still, it is not a bad Act as it goes, and wherever a Local Authority is anxious to work it effectively it need find no difficulty in doing so. It is simply a question of will. This is, it is true, a very tangible defect, and it is in some sense a defect in the Act. What the remedy for it should be, I will not undertake to say here, though I have a very distinct opinion on the subject. I have thought it necessary to write this, as by some mistake of the reporter for the SANITARY RECORD, the views which I expressed in a letter I wrote to one of the Secretaries of the Society of Medical Officers of Health, and which was read when Dr. Thursfield's paper was discussed, are entirely misrepresented.

[The report in THE SANITARY RECORD is—'A letter was read from Dr. Bond stating that, in his opinion, dairies and cowsheds should be supervised by Medical Officers of Health; and that, as Courts of Quarter Sessions and Rural Sanitary Authorities had shunted the duties, the provisions of theAct should be more actively carried out by a Central Committee'. This was the meaning as far as could be understood by his letter; and corresponds to a considerable extent with the communication now printed. Dr. Bond, however, now proposes, personally, as far as his own district is concerned, 'to hold the Court of Quarter Sessions responsible', etc. We would ask—What will he do with it?—*Rep.*]

THE

SANITARY RECORD.

FEBRUARY 15, 1881.

THE PREVENTION OF HOUSEHOLD DANGERS.

DURING the past spell of frosty weather—which was somewhat more intense and lasted much longer than usual—several deaths resulted from the explosion of kitchen boilers; four female domestics having been wounded to death at London, Oxford, Liverpool, and Dumfries respectively, as well as a workman at Blackheath and a visitor at Carlisle. Without doubt a number of similar fatalities could be gleaned from among the sheaves of provincial newspapers; and where death did not follow the disasters, there was frightful maiming by contusions and scalds, as in the two explosions at Bury, and those at Southport, Birkdale, and Straffield

Hall, Cumberland. Occasionally there were fortuitous escapes, as in the boiler explosion at Newbury, which took place when the school children were away; had it occurred earlier there would indeed have been a wailing of mothers in that quiet town. In addition to these accidents to life and limb, there were the ever-present concomitants of wrecked walls, gaping chimneys, and destroyed furniture.

We emphatically repeat that such things ought not to occur at all, and that they are the direct outcome of carelessness and ignorance—carelessness in not taking the trouble to choose a safe system of water-heating on the part of the householder, or in not taking proper advice on so important a household equipment, and ignorance on the part of the purveyor of the goods, who has not learnt to discriminate between safe and unsafe arrangements. We published in our issue of the 9th of January 1875, an article on this subject, which went to the root of the matter, and in which we explained the only absolutely safe system, a system before expounded in 'Sanitary Arrangements for Dwellings', by Mr. W. Eassie, C.E., who has repeatedly declared that he would not for any client or any fee specify the present ordinary boiler with its circulating upstairs cistern. In our issue of the 2nd October 1875, we also published an illustrated article of great value upon this subject by Alderman Bailey, of Manchester, which is worth the perusal of every householder. The truth is, it ought to be impossible to drain all the water from the boiler, and the circulating cistern should take the form of a cylinder beside the kitchen fire jambs, which cylinder also could not possibly be emptied. The cylinder would thus keep the boiler full, and the two would resist the evaporation of months, although the kitchen fire were daily in use during that period of even the severest frost.

Our houses are not well cared for as regards the gas supplies, and dangerous explosions often occur with fatal results, due to the neglect of testing the whole system of gas-piping before the connection is made with the company's meter, a matter almost universally insisted upon in America. The sense of smell, however, often makes itself useful here, whereas no such safeguard steps in with regard to our water-heating arrangements, and it is not until the bolt has fallen that the danger has made itself manifest. There can be no question, that 90 per cent. of our dwellings, in town and country alike, are fitted up with just so many torpedoes, waiting the hour when the pendulum of safety shall stop. Some five years ago, the Town Council of Salford seriously debated as to the advisability of placing every kitchen boiler in the town under inspection, and this was a move in the right direction. Our water companies have the right of entry into our residences in order to avoid the waste of their water, and the extra requisition would not entail much sacrifice of our home freedom. It would be better, however, if they possessed the power of objecting to supply houses where there is no provision made against frost, in the matter of the service to our kitchen or other boilers. The truth is, 'the world is too much with us', and few have the leisure to examine in due time the affairs which most demand overhauling. Neither does Government assist us in the matter, or grant us any Model Bye-Law on the subject. It is even laughable to watch an inspector under the Metropolitan Building Act engaged in carefully ascertaining whether or not an ordinary low pressure circulating water-pipe, which cannot under any circumstances do harm, is the prescribed three inches distant from the nearest wood-work, and taking no note of or raising any objection to a boiler behind the fire, without safety valve or expansion pipe, and a hot-water cistern upstairs, fed from a cistern placed on a cold roof, the service to which creeps up the outer wall. He has of course no obligation laid upon him to do this, and therefore, why should he? But despite this want of enforced inspection, the sooner the case is met, and someone has the power to forbid the banns of frost and death, the better for us all. The saddest reflection arises from the knowledge of the fact that our workmen know so little of natural laws. In the Carlisle accident, the poor fitter stuck to the kitchen, because he said he had 'put the boiler in himself', and it was perfectly correct. A few minutes later, he was hurled over to the majority.

NOTES OF THE MONTH.

FOREIGN FRUIT SYRUPS.

Recent investigations in Berlin have shewn that fruit syrups are subject to a great amount of deleterious adulteration. Fuchsin, eosin, and carmine are among the colouring matters employed. Some raspberry syrup, so-called, was wholly composed of syrup, fuchsin, vinegar, and amyl—ether combined with amylic alcohol; it was quite innocent of raspberries.

THE ACTION OF WATER ON ZINC AND LEAD.

M. X. Rocques, in the *Bull. Soc. Chim.* [2], xxxiii, 499–501, states that zinc tanks are often found to be corroded, and a muddy deposit settles in the tank. The action is partly chemical and partly physical. From numerous experiments M. Rocques infers (1) That zinc, lead, and copper are attacked very slowly by ordinary water and saline solutions in general (chlorides, bicarbonates). (2) If several metals are present, the action is much more rapid. (3) Nitrogenous matters and ammonia increase the effect mainly by their action on the zinc. (4) The maximum effect occurs in presence of oxygen. This is particularly the case at the surface of the reservoir, where the metal is in contact with air and water by turns. The muddy deposits consist mainly of silicates and carbonates, with 5 per cent. of zinc oxide, and 21.0 of lead oxide in one case, and in another case, where the tank had been empty for some time, 11.56 per

cent. zinc oxide, and 5.85 of lead oxide. The water from the tank was not examined. For waters charged with salts, sheet-iron tanks should be used, or at least the purest zinc, and the presence of other metals or of ammonia should be avoided. Lead pipes gave analogous results. A white crystalline deposit from tanks connected with attacked lead pipes was mainly calcium carbonate, 0.027 per cent. of lead carbonate. In boilers fed by these tubes, the lead amounted to 0.98 per cent. with a trace of copper. Iron tubes should therefore, he thinks, be substituted.

AN AMERICAN NOTION.

A stimulus to individual effort in sanitary improvement is given by the following original scheme of the Sanitary Protection Association of Newport, Rhode Island, which offers the following prizes, open to all inhabitants of Newport. First. A prize of fifty dollars to the person, not the owner of the house occupied, who shall put his or her premises in the most satisfactory condition by January 1st next, and keep them so until the 1st of June. Second. A prize of fifty dollars to the houseowner who shall do the most between September 1st, 1880, and June 1st, 1881, towards improving the sanitary condition of any occupied dwelling. Attention is to be given especially to ventilation of the house, dryness of the cellar, the water-supply, condition of cesspool or drains, and of the exterior premises, including outbuilding. Advice as to the best means, in each instance, of effecting the several conditions required, will be gratuitously given upon application to the Corresponding Secretary of the Association, Dr. H. R. Storer.

THE COMPOSITION OF VARIOUS INFANT FOODS.

Dr. N. Gerber, of Thun, has published, in the *Schweizer Wochenschrift für Pharm.*, No. 18, a table of the most usually employed foods for children sold in Switzerland, from which we abstract those which are more or less familiar to our readers:—I. Condensed milk. The numbers in the first column represent:—1. Anglo-Swiss Condensed Milk Co., Cham. 2. Swiss Condensed Milk Co., Freiburg. 3. Condensed milk from H. Nestlé, Vivis. 4. Norwegian Condensed Milk Co., Christiania. 5. New York Condensed Milk Co. (Gail Borden). 6. American Condensed Milk Co.

No.	Year.	Water and volatile substances	Salts.	Fats.	Albuminates.	Sugar.	Name of Analyst.
1..	1877	26.14	2.05	9.92	11.90	50.80	Gerber
	1878	24.70	2.11	6.02	9.77	57.40	Soxhlet
2..	1879	25.75	2.15	10.66	13.41	48.02	Gerber
3..	1878	25.28	2.03	8.62	10.25	53.82	Soxhlet
4..	1878	30.08	2.01	7.54	9.02	51.35	Soxhlet
5..	1877	27.72	1.81	8.61	9.92	51.84	Gerber
6..	1877	23.38	1.56	9.23	10.22	51.57	Gerber

Of course, condensed milk is here understood to be that variety which is preserved by the addition of a large quantity of sugar, and put up in air-tight cans. II. Farinaceous and other Food for Infants. The numbers in the first column represent the following commercial substances:—1. H. Nestlè's Food for Infants, Vivis. 2. Kindermehl of Anglo-Swiss Condensed Milk Co., Chamounix. 3. Dr. N. Gerber's Kindermehl (Lacto-Leguminose). 4. H. v. Liebig's Malto-Leguminose. 5. Liebig's Kindersuppe. 6. Dr. Frerich's Kindermehl. 7. Dr. Ridge's Food for Children, London. 8. Dr. Coffin's Food for Children, New York. Nestlé, and many others, prepare their 'food' from baked or roasted wheat-flour and condensed milk.

No.	Year.	Water and volatile substances.	Salts.	Fats.	Albuminates.	Carbohydrates soluble and insoluble.	Name of Analyst.
1 ..	1878	6.36	1.85	4.75	10.96	76.08	Physiol. Inst., Leipsic
2 ..	1879	7.79	1.46	5.44	8.84	76.45	Radenhausen
3 ..	1879	4.5	2.3	5.6	18.20	65.70	Gerber
4 ..	1879	9.42	3.01	1 34	20.47	65.66	Gerber
5 ..	1877	40.44	1.71	0.82	8.41	48.61	Gerber
6 ..	1879	7.32	2.45	0.26	16.80	74.00	Hager
7 ..	1877	3.98	1.13	1.95	9.05	85.59	Gerber
8 ..	1877	8.29	3.02	1.59	17.15	69.94	Gerber

No. 6 is, according to the German patent, saccharated flour. No. 7 appears to be only a mixture of various cereals (Gerber). No. 8 consists mostly of the flour of Leguminosæ (Gerber).

PUBLIC WATER-SUPPLIES.

The Society of Public Analysts have resolved to publish a monthly series of analyses of drinking waters, including not only the London waters, but, as far as practicable, the supplies of all the towns included in the Registrar-General's reports, and in addition to these, periodical analyses at longer or shorter intervals of the water of various other towns in which the population appears sufficiently large to justify such a step. The first monthly instalment of these analyses gives the composition of the drinking water of some two dozen provincial towns, as well as of the water supplied during January by the several London companies. The chemists whose names appear as the analysts of the various metropolitan waters are:—Mr. Wynter Blyth, Dr. Dupré, Mr. Bernard Dyer, Mr. R. H. Harland, Mr. Otto Hehner, Dr. Muter, and Mr. G. W. Wigner, F.C.S.

AMERICAN PORK AND HAMS.

Dr. Billings, the President of the American Public Health Association, and a most trustworthy, as well as eminent authority, calculates that there are four millions of trichinous hogs in the States, and urges the importance of public supervision, and scientific study of the matter.

THE COLOURING OF WALL-PAPERS.

Herr Bernbeck calls attention, in the *Pharmaceutische Zeitung*, Dec. 11, p. 792, to a possible inconvenience resulting from the use of ultramarine in the colouring of wall-papers. He states that a room covered with an ultramarine coloured paper was observed to be tainted by a smell of sulphuretted hydrogen, the source of which long escaped detection. Eventually, however, it was associated with the paper, and a closer examination led to the conclusion that the ultramarine on the surface was being slowly decomposed under the influence of the alum in the paste used in hanging the paper. This appeared to be confirmed by the fact that a piece of the paper steeped in very dilute solution of alum, gave off sufficient sulphuretted hydrogen to be perceptible to the nose and to blacken lead paper.

LOCAL GOVERNMENT AT EDMONTON.

A deputation from the Edmonton Local Board has had an interview with the President of the Local Government Board, on the subject of the Bill which is being promoted in Parliament, for the division of the Edmonton Local Government District. Mr.

Herbert Gladstone, M.P., introduced the deputation. It appeared from the statements made, that the western part of Edmonton desired, by a Bill in Parliament, to separate themselves from the eastern part, after the latter had incurred great expense in doing necessary local work for the benefit of the whole district, and after the eastern part had successfully accomplished the task of giving a good supply of gas, water, and a sewage system. They also declared that the proposed separation was against the wish of the inhabitants, and would perfectly ruin the eastern part. Mr. Dodson promised that their representations should be duly considered.

THE PUBLIC HEALTH
DURING JANUARY 1881.

THE mean temperature during January at the Royal Observatory, Greenwich, was only 31°.6, and was no less than 4°.7 below the average January temperature in a hundred years. Last month was the coldest January during the past thirty years, the nearest approach to it occurring in 1879, when the mean temperature did not exceed 31°.8. The mean was below the average on twenty-four of the thirty-one days last month. Severe frost set in on the 12th, and lasted till the 26th, inclusive. During these fifteen days, the lowest reading of the thermometer showed an average daily amount of 13° of frost. A frost of such severity has not occurred since 1855, when the average daily degrees of frost between the 9th and the 23rd of February was almost identical with that recorded during the fifteen days of last month. Rain, or melted snow, was measured at Greenwich on seven days last month to the aggregate amount of 1.2 inches, which was 0.7 below the average January rainfall during sixty-one years. The sun was above the horizon during 259.1 hours in January, but only 31.8 of bright sunshine were recorded; the average amount of recorded sunshine in the three preceding corresponding months was 30.7 hours. Northerly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's weekly returns, containing a population of more than seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 21,288 births and 15,275 deaths were registered during the four weeks ending the 29th January. The births were equal to an annual rate of 36.5 per 1,000 of the estimated population in the twenty towns, against 35.2 and 33.8 in November and December. The birth-rate last month was 36.8 in London, and averaged 36.1 in the nineteen provincial towns; it ranged from 29.5 and 30.2 in Brighton and Plymouth, to 40.0 and 40.6 in Liverpool and Sunderland.

The annual death-rate during the four weeks of January was equal to 26.2 per 1,000 against 22.1 and 20.5 in the two preceding months. This marked increase in the death-rate during January was entirely due to the exceptionally low temperature that prevailed. The average January death-rates in these twenty towns during the three years 1878-9-80 were respectively 25.6, 27.7, and 26.0. The death-rate last month, therefore, notwithstanding the inclement weather, was slightly below the average rate in the first months of the three preceding years.

The lowest annual rate of mortality in the twenty towns last month was 19.2 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow: Bradford, 20.4; Leicester, 20.6; Brighton, 21.8; Newcastle-upon-Tyne, 22.4; Hull, 23.1; Sheffield, 23.4; Birmingham, 24.1; Sunderland, 24.7; Leeds, 24.9; Norwich, 25.0; London, 25.5; Bristol, 25.5; Wolverhampton, 27.5; Oldham, 29.3; Plymouth, 29.6; Salford, 29.8; Nottingham, 29.9; Liverpool, 32.5; and the highest rate during the month, 36.6 in the city of Manchester. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during January averaged 26.8, while in London it was equal to 25.5. The high death-rates during last month in Liverpool and Manchester were mainly due to the exceptional fatality of diseases of the respiratory organs.

The 15,275 deaths from all causes in the twenty towns last month included 1,547 which were referred to the principal zymotic diseases; of these, 401 resulted from scarlet fever, 377 from whooping-cough, 271 from measles, 158 from small-pox, 145 from fever (principally enteric), 135 from diarrhœa, and 60 from diphtheria. These 1,547 deaths were equal to an annual rate of 2.6 per 1,000 in the twenty towns during the four weeks under notice, corresponding with the rate that prevailed in the preceding month. The zymotic death-rate last month was equal to 2.9 per 1,000 in London, and averaged 2.4 in the nineteen provincial towns. The lowest annual death-rates from these seven diseases during January were 1.4 and 1.6 in Wolverhampton and Bradford, while the rates ranged upwards in the other towns to 3.2 in Salford and Nottingham, and 3.3 in Liverpool. The high zymotic rates in Nottingham, Salford, and Liverpool were due to the general prevalence of these diseases rather than to the epidemic prevalence of any one of them. Scarlet fever was the most fatal zymotic disease during last month, but its fatality showed a considerable further decline from that which had prevailed in recent months. The annual death-rate from this disease in the twenty towns, which was equal to 1.04, 1.07, and 0.90 per 1,000 in October, November, and December, further fell to 0.69 in January. The largest proportional fatality of scarlet fever last month occurred in Oldham, Norwich, Sunderland, and Bristol; the fatality in scarlet fever in Sunderland showed, however, a marked decline from that which prevailed in recent months. The death-rate from whooping-cough showed a further general increase last month, and was highest in Nottingham and Leeds. The 145 deaths from fever (including typhus, enteric, and simple continued) in the twenty towns were equal to an annual rate of 0.25 per 1,000, and showed a further decline from the fever rates in recent months. In London the death-rate from fever during January was slightly below the average in the nineteen provincial towns. The fatality of measles differed but slightly from that which prevailed in the preceding month; it was proportionally greatest in Salford and London. The 60 deaths referred to diphtheria in the twenty towns included no less than 40 in London, while only 20 occurred in the nineteen other towns; of the latter, 4 were returned in Portsmouth, 4 in Liverpool, and 3 in Brighton. Small-pox caused 154 more deaths in London, 3 in Birmingham, and 1 in Plymouth, whereas no fatal case of this disease occurred in any of the other seventeen provincial towns. The prevalence of small-pox in London showed a marked further increase during January, and the number of small-pox patients in metropolitan asylum hospitals, which had been successively 105, 210, and 440 at

the end of October, November, and December, further rose to 520 on the 29th January. The average weekly number of new cases of small-pox admitted to these hospitals, which had been respectively 20, 53, and 97 in the three preceding months, further rose to 115 during the four weeks of January. The increase of small-pox during last month was most marked in the East London districts.

The fatality of diseases of the respiratory organs, which had been exceptionally small during the two preceding months, showed a marked increase during January. The average weekly number of deaths referred to these diseases in London, which had been but 369 and 316 in November and December, increased to 513 during the four weeks of January; this number was, however, only 37 above the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London, which had been equal to 5.3 and 4.3 per 1,000 during November and December, rose to 7.2 in January. The death-rate from lung diseases in Salford last month was equal to 11.6 per 1,000.

In the outer ring of suburban districts around London, having a population of little less than a million persons, during January the annual death-rate from all causes did not exceed 18.9, but showed a considerable increase upon the rates in the two preceding months, which were 16.8 and 15.5. The zymotic death-rate in suburban London was equal to 1.8 per 1,000, against 1.6 both in November and December. The rates from all causes and from the principal zymotic diseases in inner or registration London, were, as before stated, 25.5 and 2.9 per 1,000, respectively, during last month. It would be interesting to know how far the very favourable mortality statistics of suburban London, compared with inner London, may be attributed to more satisfactory sanitary condition, and the less vitiated atmosphere in which the population resides.

SPECIAL REPORTS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on January 21st, Dr. Tripe in the chair. After the minutes had been read, letters of thanks from Dr. Ogle, Deputy Registrar-General, and Dr. Reid, Director-General of the Medical Department of the Navy, were also read, acknowledging their election as Honorary Members. Dr. Dodsworth, Medical Officer of Health for Chiswick, was elected an extra-Metropolitan Member, and Dr. Bakewell, of Hokitika, late Medical Officer of Health, Trinidad, as a Member. Dr. Billings, of New York (Surgeon-General), was proposed as an Honorary Member. Dr. Longstaff then read his paper on 'Summer Diarrhœa', which will be found at page 291.

In the discussion which ensued, Dr. Connolly mentioned that in his experience the disease occurred chiefly in houses having two families in them, but in which there was not any sanitary defect found on examination.—Mr. Wynter Blyth thought the facts were difficult to discuss, and that we should be careful not to draw conclusions from insufficient data, and also pointed out that diarrhœa is often fatal in winter.—Dr. Browning had seen a good deal of winter diarrhœa, and said it was well known to Dr. Lind in the last century, and thought it was frequently caused in children by a disordered condition of the nervous system.—Dr. Tripe said that he had seen very many cases of winter diarrhœa, and believed them to be essentially different from the disease under consideration. He thought the summer diarrhœa prevalent in Leicester arose partly from special local causes, as the proportion of deaths of males in proportion to females was, in comparison with other towns, extraordinarily large.—A vote of thanks was carried unanimously to Dr. Longstaff, after he had replied.

Dr. Browning then read his paper on the 'Death-Rates of Children under five years of age from various Diseases'. He first considered what was the most practical method of dealing with the subject. He had taken the returns of the Registrar-General, and reports of some Medical Officers of Health, for the ten years, 1861-71, and quoted figures showing that in the healthy districts, 35.1 children under five years of age died out of each 1,000 living at that age, 52.6 in all England and Wales, 74 in London, and 92 in the unhealthy districts; that the child death-rate was in some localities 50 per cent. of the births, the mean being 25 per cent.; amongst inmates of asylums it was only 3 per cent., and 10 per cent. amongst children of the upper classes. From these great differences he believed that much of the mortality amongst children is preventible, even after allowing for constitutional defects. He pointed out that certain diseases are unusually fatal to children. For instance, small-pox and diphtheria caused a large mortality in London; brain and lung diseases are unusually fatal in Liverpool; whilst, in proportion to other causes, deaths from tubercular diseases and cancer are unusually prevalent in the 'healthy districts'. As regards the figures taken from reports of Medical Officers of Health, he had selected those in which the Society's forms were adopted, and showed that out of each 1,000 children living, under five years of age, there were 22.8 deaths from zymotic diseases in Bermondsey, 20.4 in Limehouse, and 18.1 in St. Giles', against 15.6 in Bethnal Green, 13.5 in Hackney, and 13.3 in Kensington. The deaths from 'constitutional causes' were smallest in Bermondsey and St. Giles', and highest in Kensington and Bethnal Green; whilst from 'local causes' they were largest in Hackney and Islington. He thought that the type of contagious diseases is aggravated by bad food, overcrowding, and want of cleanliness.

Dr. Longstaff remarked the low cancer death-rate in London, especially considering the number of hospitals in this city, and thought that it probably arose from marriages here being more mixed, and less of what is called 'breeding in'. He also mentioned the fashion in Wales of returning deaths amongst respectable people as being caused by phthisis.—Dr. Tripe agreed with Dr. Browning in his opinion that a very large proportion of the mortality amongst children is preventible, even after allowing for the necessary privations which occur amongst the poor.—After a vote of thanks to Dr. Browning, the meeting adjourned.

THE YORKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

AT the meeting of members of the Yorkshire Association of Medical Officers of Health held at the Wakefield Town Hall, Mr. W. S. North, (Medical Officer of Health for York), President of the Association, occupied the chair, and the following members were present:—Mr. T. Scott, M.D., Ilkley; Mr. J. Farquhar M.D Pudsey; Mr. J. Mitchell Wilson, M.B.,

Secretary of the Association; Dr. T. Whiteside Hime, Sheffield; Mr. F. H. Wood, Wakefield; Mr. B. Kemp, Horbury; Mr. W. S. Wade, M.D., Wakefield; and Mr. H. Butterfield, Bradford. A number of the Members visited the Wakefield Hospital for Infectious Diseases, and afterwards, in response to an invitation from Dr. Major, they proceeded to the West Riding Asylum, and inspected the admirable internal arrangements of that important institution. A meeting of a Committee of the Association was held in the Town Hall in the afternoon, and that was followed by the general meeting.

The PRESIDENT said the members were much indebted to Dr. Major, who took a deep interest in sanitary science, for having allowed them to see the asylum. They were also under an obligation to Dr. Wade for taking them over the fever hospital, for at present few institutions were of deeper interest to Medical Officers than hospitals for infectious diseases. It was highly necessary that something should be done to cope with infectious diseases, which were spreading so much, and it was impossible to do anything effectually unless they had places in which to isolate cases on their first appearance. The erection of fever hospitals was a step towards real progress in this direction. The late Secretary of the Association (Dr. Barry) had been appointed to a high position as a Medical Officer of Health in Cyprus, in which post they wished him long life and success. It would be well to elect Dr. Barry an honorary member of the association. Turning to the general subjects which came within the province of the Medical Officer of Health, the President said the attention of nearly every Medical Officer in the country had been directed during the past year to the enormous increase of infant mortality. The death-rate from diarrhœa was so startling that the Local Government Board had determined to appoint a special officer to investigate the causes of deaths arising from this source. The subject was shown to be worthy of inquiry by the fact that whilst in some towns the death-rate from this cause was enormous, in other places it had only been slight, thus proving that it must be in some measure preventable. The association was taking measures to evoke the interest of its members on this particular subject, and he trusted they would all send to the secretary all the information they possessed which might be of service in throwing light on the matter. With a view to the further discussion of the subject, they had arranged to have a joint meeting with the Northern Counties Associations, either at York or Leeds, some time in April, to consider specially the whole question of infant mortality. The subject was entirely open, and he was afraid there were no clear indications of the causes of the serious death-rate of infants. It was hoped that an inquiry, conducted by a competent person, might bring out some important fact with regard to the common cause. In accordance with the opinion of Dr. Greenhough, who made an examination of the diarrhœa districts of England and Wales twenty-five years ago, the Local Government Board ascribed the cause to some sort of filth pollution. The Local Government Board had stuck to that tradition, but he thought they would have to look further afield for the cause.

Mr. W. S. WADE, M.D., read a paper on 'The Sanitary Condition of Wakefield during the last Ten Years.' He said that twelve years ago the borough was in a very insanitary condition. The system of sewage at that time was calculated to cause rather than to prevent disease; so much so that it might be said that they had fever and diarrhœa laid on to their dwellings almost as systematically as the gas and water were supplied to them. Their ash-middens were open to the rain. The water, supplied by a company, was fairly pure, considering its source, the company having made good use of Spencer's purifying process. At one time they had had serious typhoid epidemic and outbreaks of diarrhœa, among the causes of which he believed to be the character of the water (which they pumped up from deep wells) as well as manholes and untrapped gullies. He attributed many diarrhœa cases to improper feeding of infants by those whom mothers left in charge when they went out to work. About a year and a half ago there was a sudden outbreak of diarrhœa near the Calder, and at that time he found the households, some members of which were affected, pumped all their water from a well near their common wash-house. That water, though bright and sparkling, might have been very poisonous, as often was the case. The efforts of Medical Officers should be directed to the discovery and removal of causes rather than merely contenting themselves with isolating the cases of disease. In certain cases of outbreak of scarlatina he had found that School Board children formed the nuclei of those affected. He suggested at the time the closing of certain schools, but the Board replied that they had not the power to do so. The Association would do well to bring that important question before Parliament, with the object of empowering School Boards to close a school on its being certified by a Medical Officer to be a means of propagating disease. With regard to hospitals for infectious diseases, he thought the public prejudice against the removal of sufferers to such places might easily be overcome, and that if relatives would only make early application for the isolation of those affected, towns would be comparatively free from epidemics. In conclusion, Dr. Wade said he had in all his arrangements been well supported by the sanitary authority of the district.

The PRESIDENT pointed out the great importance of ascertaining, if they could, the distinction between the two forms of diarrhœa. The one form ran into the other so closely that it was almost impossible to say whether there was a specific disease which the Americans designated cholera infantum. It was very important that they should know whether there was a zymotic diarrhœa which could be distinguished or classified. The Medical Officers of watering places were in the habit of placing all forms of infantile diarrhœa to the account of the class known as 'symptomatic'. Anent the suggestion with regard to the closing of schools, it must be borne in mind that children often were brought into as close communication at or around their homes as they were at school. Besides, as some districts were almost permanently affected with zymotic diseases, it might be found necessary, on the principle suggested, to permanently close the schools in those neighbourhoods. School Boards should have the power to keep at home affected individual boys or girls, but the power to close schools might become a serious hindrance to the spread of national education. With reference to open middens, the sanitary authority neglected its duty so long as it did not seek to abolish middens of every kind altogether. As to open grates, the main consideration was what were their effects on the health of the people. Of course when they became so offensive that people cried out for their removal, they should be removed without delay.

Mr. BUTTERFIELD was of opinion that there must have been some other contributory cause of an outbreak of typhoid fever in Wakefield besides that of drinking impure water from a well. It might possibly have been that the germs of the disease had contaminated the water itself. Alluding to the closing of Board Schools to prevent the spread of disease, he remarked that such power was being applied for in Bradford. Were it obtained, however, it would be exercised with very great caution. They were also applying for powers for compulsory notification of disease, a regulation which, if put into force, might avoid the necessity of closing schools. Shortly before last Christmas, in 100 houses in a certain district in Bradford there were 16 cases of scarlet fever. From those 100 houses 130 children attended Board Schools, and it was found that the whole outbreak originated from two scholars who had had a slight attack of the disease and who had not been attended by medical men. Those two children went to school with the effects of scarlet fever upon their hands, and their fellow scholars amused themselves by picking the loose skin which the disease had left off their fingers. With regard to moving cases of infectious disease to hospitals, the public of Bradford were getting in advance of the profession. So many parents were anxious to have their children removed to hospitals that the medical men objected. Sewers were ventilated in Bradford, and he found no inconvenience or complaint resulting therefrom. He was afraid it was impossible to differentiate zymotic diarrhœa from diarrhœa brought on by improper feeding.

Dr. FARQUHAR said that some time ago about half the children in the largest Board School in his district were affected with scarlatina. A powerful remonstrance from him resulted in the closing of the schools, and the epidemic was stopped immediately. The remedy of stepping between children and their education should be used very sparingly, and all who proposed it should be very certain of their ground. The Chairman had spoken of the collateral evil of aggregating children who were supposed to be at school in and around their dwellings at home; but it should be recollected that children did not congregate together so closely and in such large numbers at home as they did in public schools.

Dr. HIME said the Sheffield School Board were so anxious to have all the children at school it was possible to get there, that when in a family two or three children were suffering from scarlet fever and one child was well they insisted upon the healthy child attending school. Whilst it might be difficult to distinguish between the two classes of infantile diarrhœa, there could be no doubt of the existence of an epidemic diarrhœa which was very serious. If it were true that the drinking of dirty water was a common cause of diarrhœa, how was it that in Sheffield, where not one in ten thousand houses were supplied from wells, they had a considerable stock of diarrhœa?

Dr. WILSON said that the moment they began to insist on the absence of children from school they lessened the fees of the teachers, and deprived the school of some portion of its Government grants. That should be borne in mind before they put the case as to the closing of schools strongly before the Education Department. All possible assistance should be given to the teacher in dealing with individual cases of disease.

The PRESIDENT thought it was very important that the period for which a Medical Officer could detain a person suffering from infectious disease—especially small-pox and scarlet fever—in the hospital should be defined. How soon should he be able to allow him to go out, and what was the longest period for which he could keep him.

Mr. BUTTERFIELD said that he had known cases last over eight weeks. He does not think that the usual six weeks is at all sufficient. The disease often extends over two months, and sometimes three months.

The PRESIDENT said that, now that fever hospitals were multiplying on every hand, the question was very important. If patients could go in and come out when they liked, and whether they were clear of the infection or not, nothing would be gained. Medical Officers had no power at present in the matter, except where a person broke the law. It would be well to ask Parliament to establish some rule for their guidance.

Mr. BUTTERFIELD, in a paper entitled 'Notes on Woolsorters' Disease', passed in review some of the phases of the peculiar disease to which men employed in sorting wool and hair are subject, and upon which some light is being thrown by a Commission of which Mr. Butterfield is a member.

In accordance with the suggestion of the President, Dr. Barry was elected an honorary member of the Association.

The proceedings closed with a vote of thanks to the Mayor of Wakefield for having allowed the Association to meet in the Town Hall.

THE KYRLE SOCIETY.

THE first meeting of the Kyrle Society was held in the Town Hall, Kensington, on the 28th ult. Prince Leopold, the President of the Society, was in the chair, and Princess Louise, the Vice-President, was also present. His Royal Highness said that the primary object of the meeting was to consider suggestions for forwarding the objects of the National Health and Kyrle Societies for reducing the mischiefs arising from the present excessive production of smoke in the Metropolis, but before calling on gentlemen present to move their resolutions he was anxious to make a few remarks on the work of the Society, in which he took a deep interest. The germ of the Kyrle Society was in a letter written by Miss Hill entitled, 'A Suggestion to those who have Beautiful Things', which contained an irresistible appeal for aid and sympathy in her wish to 'diffuse a love of beautiful things among our poorer brethren'. One of the objects the Society had most at heart was to secure the preservation of open spaces in poor neighbourhoods, for the purpose of laying them out as public gardens. His Royal Highness then related the history of the movement in which the Society took part, which resulted in the acquirement of Burnham Beeches by the Corporation of London, and in the resolution of the Surrey justices to preserve the site of Horsemonger Lane Gaol. The justices, he said, had decided to keep the ground in their own hands, and had referred to a committee the question of the best means of preserving the ground as an open space. They desired at the same time that some benevolent or public body should pay a moderate rental for the site, and the Society was now negotiating with them on the subject. Negotiations were also in progress for the acquisition of two burial grounds at the back of the Foundling Hospital; but in this case there were legal hindrances which, it is hoped, may be removed by an Act of Parliament that had been drafted by a

friend of the Society. Another phase of the Society's labours to which they attach special importance is the formation of a voluntary choir of singers, to give oratorios and concerts to the poor. The third object is the Society's decoration by mural paintings, pictures, gifts of flowers, and other means, of workmen's clubs, schools, hospitals, and other buildings. Resolutions in support of the objects of the Society were passed, and the proceedings closed with a cordial vote of thanks to Prince Leopold and the Princess Louise.

THE BUILDERS' AND MANUFACTURERS' EXCHANGE AND SUBSCRIPTION ROOMS.

THE commencement of a new year affords a seasonable opportunity for noticing any improvements or additions to existing institutions, and the year 1881 opens upon what we may safely describe as a new departure for those, at all events, who are in any way concerned in the improved construction of dwellings, or who are engaged upon works of public utility. We therefore desire to call attention to the Builders' and Manufacturers' Exchange and Subscription Rooms, 205-6, High Holborn, London, which have been organised for the purpose of affording increased facilities to all engaged in building operations. The plan proposed for the purpose is comprehensive in all its details. Here may be found all the trade journals and current literature affecting the interests sought to be served, and which are to be regularly filed for reference. The subscription or reading room is furnished with every necessary material for the convenience of all who may enrol themselves members. Lock-up desks and private offices will afford considerable advantages for those who may require a London address with the maximum of convenience at the minimum of cost.

The Sanitary Department will receive special attention, as evidenced by the practical adaptation to the building itself of a system now extensively advocated by architects and sanitary engineers, and will afford an ample illustration, not only to the scientific world, but to every householder, of the benefits to be derived from the Banner system of sanitation, as the soil, drain, and sewer pipes can be here seen perfectly and efficiently ventilated, effectually precluding the possibility of any sewer gas remaining or being generated within any of the drain or soil-pipes communicating with any part of the building; or more accurately expressed, the wind is constantly utilised to cause a current of air to pass through the drain and the soil-pipe separately constantly enough to carry away the gases usually formed in them, before they are sufficiently concentrated to do any harm. In the Exhibition, or Sample Room, will be found various specimens of sanitary apparatus, as well as all materials comprised in the construction of any building.

The subscription is moderate, and we commend this useful undertaking to the attention of our readers, feeling sure a visit to the premises will amply repay the time expended.

At Walker-on-Tyne, where one person is supposed to perform the duties of Inspector of Nuisances, Collector of Rates, etc., Dr. H. F. Hurst, the Medical Officer of Health, reports that in the month of December the death-rate average was 31.5 and the birth-rate 4.25 per 1000 per annum. If this arrangement be economical in a pecuniary sense, it is certainly the opposite as regards human life.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

BARNSLEY.—The chief feature in Dr. Sadler's report is an exhaustive and able defence of the principle of sewer ventilation, which, it appears, has been questioned at Barnsley. He goes at length into the dangers of sewer air, and shows that the only way to render it harmless is to dilute it by ample openings from the sewers into the outer air. A large quantity of sewerage pipes were laid down during 1879, and a considerable number of midden privies were converted on an improved model. The general state of the public health is reported to have improved, though an epidemic of scarlatina and the fatality from chest affections considerably swelled the death-rate. During the year a total of 641 deaths occurred in the town, giving on the estimated population a death-rate of 21.79 per 1,000. The mortality amongst infants and amongst children was unduly high, 29.9 and 47.84 per cent. of the deaths occurring amongst children under one year and under five years respectively. Zymotic deaths caused 81 deaths, scarlatina alone being responsible for 46. Efforts have been made to check the mortality from this latter disease, but when the report was written, it was still raging.

BETHNAL GREEN.—Dr. Bate gives a fairly favourable account of sanitary progress in this district in his report for 1879. The condition of the slaughter-houses is reported as tolerably good, but numerous defects in the sanitary and structural arrangements of the cowhouses were discovered. Pending, however, the action of the Metropolitan Board of Works, no opposition was made to the renewal of any of the licenses. The fish curing nuisance has abated, but some of the premises are still very dirty. The establishment of a properly fitted-up mortuary on the disused burial-ground of the parish will be a great boon. From the description and plans given of it, it seems to be a very complete structure of its kind. In 1879 the death-rate of Bethnal Green was exactly the same (23.0 per 1,000) as in 1878 and 1877. Dr. Bate is by no means satisfied with this 'stationary condition of things', and urges improvements in the sanitary arrangements of dwelling-houses. The number of deaths from zymotic disease was 474, or a rate of 3.5, against 3.9 in 1878. Small-pox caused one death, and 45 cases of it were known to the sanitary officials. Measles and whooping-cough were very fatal to young children, causing 106 and 147 deaths respectively. Scarlatina was also especially fatal to the young, 56 out of the 76 deaths from this cause being in children under five years. One death was registered from typhus, 33 from typhoid, and nine from simple continued fever. Tubercular diseases were, as elsewhere, very prevalent and fatal.

BIRKENHEAD.—In this large and growing borough a total of 3,112 births and 1,631 deaths were recorded in 1879, the natural increase of the population being, therefore, 1,481. The general death-rate was 19.23 per 1,000, a rate lower than any of the fifty large town districts of the Registrar-General, with four exceptions, although only three of these fifty towns are larger than Birkenhead. Of the gross mortality, the deaths of infants accounted for 651, of children and young persons for 155, of adults for 497, and of old people for 328. The proportion of deaths of infants is much less, and the proportion of deaths of old people much more than the average of towns and populous districts. The death-totals were much

higher in the first and fourth than in the intervening quarters. The increased death-rate in the first quarter was mainly due to the increased fatality of bronchitis; that in the fourth quarter to the prevalence of scarlatina. Of the total deaths, 307 were ascribed to zymotic diseases, 201 to constitutional diseases, 733 to local diseases, 284 to developmental diseases, and 77 to violence. The chief zymotic diseases of the year were scarlatina and diphtheria; but the mortality from most of these diseases was very much below the average. Mr. Vacher gives an interesting account of an outbreak of typhus in the town, which seems to have been largely spread by a 'wake' held over the body of one of the victims. We are glad to hear of the continued usefulness of the Fever Hospital, which has already done much good work, and promises to do more.

BRADFORD (YORKS).—Compared with the other nineteen large towns, Bradford holds a very favourable position as regards its mortality statistics for 1879, only three having a lower death-rate, none of these being large manufacturing towns. The deaths numbered 4,106, equal to a rate of 21.1 per 1,000, the lowest ever recorded in Bradford, and 3.1 below the average of the six preceding years. The proportion of infantile deaths to total births fell from 20.5 per cent. in 1873 to 15.2 in 1879. Zymotic diseases caused in all 471 deaths. Though no death from small-pox was recorded, there were several cases, the majority arising among rag-sorters at a wool extracting establishment. The mortality from measles showed a considerable increase, and scarlatina was very prevalent, 184 deaths being registered from it. There was an outbreak of diphtheria which appeared to be in relation with the supply of milk from a particular and probably infected source. The number of deaths from fever was smaller than in any year on record, and even of the 45 deaths recorded, many, according to Mr. Butterfield, were not really cases of fever. Whooping-cough caused 69 deaths, but the long-continued epidemic of that disease in the borough is reported to be now subsiding. Owing to the exceptionally cold and wet summer, the deaths from diarrhœa were fewer than in any previous year. They numbered only 67—the average for the last ten years being 201. A great amount of sanitary work, especially as regards defective drainage and privy reconstruction, was effected during the year. The question of what to do with dry ashes has now been solved by the purchase of one of Fryer's Patent Destructors. A disinfecting apparatus has also been set up, and has already been of much service. It is very satisfactory to find that the fever hospital is increasing in usefulness and popularity—no less than 157 cases, many of them private patients, being admitted during the year.

BRIDGWATER URBAN AND RURAL.—For the Urban District of Bridgwater Mr. F. J. C. Parsons chronicles a death-rate of 16.3 per 1,000, and for the Rural District one of 15.1 per 1,000. In the Urban District 26 deaths occurred from phthisis and 14 from bronchitis. Sixteen deaths occurred from zymotic disease, against 30 in 1878. The infantile mortality shows a very marked diminution, due, no doubt, to the absence of summer diarrhœa. The drainage of the town is still extremely defective, but the state of the finances of the town is such that the Medical Officer regards it as inevitable that the consideration of the subject should be deferred. He recommends, however, the provision of baths and wash-houses, of a public abattoir, and of a public mortuary—works that would seem to have their proper place after the provision of so great a necessity as drainage. Sixty-seven vessels arrived in the Bridgwater river from foreign parts during the year, but no case of infectious disease was reported. In the Rural District a large number of deaths occurred from bronchitis. Measles and whooping-cough were prevalent in the Petherton district, and typhoid fever was reported in several parishes. A number of nuisances were abated, but there are several villages which need a system of drainage without delay. The water-supply of the district is another question that requires early and anxious consideration.

BRIGHTON.—Brighton took, in 1879, second place amongst the large towns for the lowness of its death-rate, which was 18.9, as compared with a ten years' average of 20.6 per 1,000. Of the 1,997 deaths, 130 were those of non-residents and 1,867 of residents; 408, or 20 per cent., were of infants under one year, and 656, or 32.9 per cent., of children under five years. Zymotic diseases caused 151 deaths—considerably below the average. Small-pox was eight times imported into the borough, but did not spread, nor were any of the cases fatal. Whooping-cough and measles accounted for the greater part of the zymotic deaths. Diseases of the respiratory organs—including phthisis—caused 665 deaths, or a third of the total. During the year a large number of connections were made with the main drainage, and over seven thousand houses were inspected. It is remarkable to read that the Town Council have only just determined to build a hospital for infectious diseases, and that there is no public mortuary in the borough.

CALCUTTA.—Dr. Payne having resigned the appointment of Health Officer for Calcutta, which he filled with so much credit, Dr. McLeod has been appointed in his place. The new officer, having only assumed charge of the department towards the close of 1879, has not much to say from personal knowledge, and confines himself to a criticism of the health statistics of the year. It appears from these that the death-rate was above the decennial average, but below that of the two preceding years. Fevers, small-pox, and 'other diseases' were more than usually fatal, but cholera and bowel complaints were below the average. The higher district death-rates were, as usual, found in the more crowded and destitute portions of the town, where sanitary neglect is most glaring. The death-rate among infants under one year, though lower than in 1878, maintains a lamentably high level—the excess occurring entirely amongst the Asiatic and mixed races. Tetanus, fevers, convulsions, and bowel complaints account for the great majority of these infant deaths. The yearly mortality from cholera falls short of the decennial average by 380, and there are only three years in the decade that present lower numbers. The climax was later in the year than usual. Small-pox was epidemic during the early part of the year—a circumstance which has prompted the institution of measures for a reduction in the large number of unvaccinated children in the city.

CANNOCK RURAL.—Mr. Manby's report for 1879 is brief, but contains some not unimportant points. He speaks out boldly to his Authority as to their retrograde step of shelving a much needed scheme of drainage on the report of the Inspector of Nuisances, and intimates that as his suggestions as to disinfection, etc., have not been accepted by the Authority, the responsibility in case of an epidemic does not now rest with him. During the year there were 524 births and 262 deaths, but the rates per thousand to which

these are equivalent are not given. The deaths under five years were 80 in number, or 25 less than in 1878. Phthisis accounted for 22 deaths, and bronchitis, pneumonia, and pleurisy for 48 more. The zymotic deaths numbered 30, as against 27 last year. Fourteen were from scarlet fever, nearly all of which occurred early in the year.

CLEATOR MOOR.—The death-rate of this district was considerably higher in 1879 than it had been for some time, but Dr. Eaton seeks to give his Authority comfort by showing that the rate in the adjoining rural district is a good deal higher than that of Cleator Moor. Two blacks, however, do not make one white. To the extreme variability of the weather, and the epidemic prevalence of measles, especially in the fourth quarter, is ascribed the increase in the number of deaths, which amounted to 154, the highest number since the year 1874. The rate of infant mortality was equal to 134 per 1,000 births. Amongst zymotic diseases, measles caused 9 deaths, scarlet fever 5, and typhoid fever 2. Bronchitis caused 29, phthisis 30, and the wasting diseases of infants 21 deaths. During the year 201 nuisances were abated, 11 houses were provided with water-closets, and the water-works were extended. A hospital for infectious disease has been provided in conjunction with other districts, but a disinfecting apparatus does not seem to form part of it.

COCKERMOUTH RURAL.—In a paper of great merit on 'Impure Air as a Cause of Disease' which Dr. Ward has recently contributed to these columns (July 15th, 1880), he has gone at length into the connection which he believes to exist between defective ventilation and diseases such as tubercular complaints, consumption, hydrocephalus, inflammation of the brain, diseases of the respiratory organs, etc. The same line of argument as is pursued in the paper above alluded to runs through the present report; and we need not do more, therefore, than refer our readers to Dr. Ward's published paper for particulars on the subject. The report, which is an eminently suggestive one, but which the Local Board declined to print, shows that Dr. Ward has been working with great zeal during the year. Epidemics of whooping-cough and measles seem to have given him much trouble, and several cases of enteric fever are reported. Scarlatina was fatal in six cases, each of which receives detailed consideration in the report. The general death-rate was 17.8 per 1,000, a fractional improvement on that for 1878. The most important sanitary work of the year was the prosecution of an extensive scheme of water-supply from the Crummock basin. Dr. Ward seems to have to contend with a good deal of *vis inertiæ* on the part of local landowners.

EPPING RURAL.—In this district there were 632 births and 349 deaths in 1879, equal to rates of 27.7 and 15.0 per 1,000. Zymotic diseases caused 39 deaths, 1 being due to measles, 3 to diphtheria (in connection with a general prevalence of sore-throat in the district), 17 to whooping-cough, 10 to fever, and 8 to diarrhœa. There was an almost total absence of autumnal diarrhœa, doubtless due to the excessive rainfall and low temperature. Dr. Fowler's record of sanitary work is brief, but is sufficient to show that the district is well looked after—689 inspections having been made by the inspector, and 221 notices sent.

FINCHLEY.—A special word of praise is due to Dr. Turle for the excellence of his first annual report, which is quite one of the best that have come before us. Dr. Turle opens the report with a picture of the actual sanitary condition of the district, telling the Local Board of the special dangers attaching to each defect, and reminding them of the necessity of improvement. This part of the report is by far the most valuable, but of course it is necessarily of local interest only. With its advantages of situation, Finchley clearly should rank among the healthiest of sanitary districts; and as a matter of fact its death-rate was in 1879 at the satisfactorily low rate of about 12.5 per 1,000. Fortunately zymotic diseases were to a large extent absent, but there are many conditions in the district likely to favour the spread of such diseases, and it behoves the Authority to be on the alert in removing these conditions as soon as possible. No fatal case of typhoid occurred during 1879, but several severe cases of that disease came to Dr. Turle's knowledge. Diphtheria and croup caused three deaths each, and whooping-cough 13 deaths, all in children under five years of age. As elsewhere, bronchitis and diseases of the respiratory organs claimed a large number of victims. The passing of a code of building bye-laws is a great step in advance, but the Sanitary Authority have evidently much sanitary work before them.

GLOUCESTERSHIRE.—Dr. Bond states that though the sanitary history of his district during 1879 was very uneventful, the results will bear comparison with those of any previous years. Although the general death-rate has slightly increased, the rate from zymotic disease has, with one break, steadily diminished, till there is a difference between 1874 and 1879 of nearly 40 per cent. Only two cases of small-pox were recorded in 1879, but measles was again prevalent, though not to so serious an extent as in the previous years. Only thirteen deaths from scarlatina were registered, the cases which occurred having been generally of a sporadic character and the type mild. In view, however, of the periodic recrudescence of the disease, it is to be regretted that no better provision for isolation exists in the district. Whooping-cough was on the increase during the year, and caused 43 deaths. Diphtheria caused 29 deaths, against 30 in the previous year, and continued fevers 30, against 35 in 1878, and 38 in 1877. Dr. Bond reports that no constructive works of any importance were carried out during the year, except at Cinderford, which is being drained. The abatement of nuisances was generally maintained with fair activity, though not nearly so satisfactorily in the districts of those Authorities who do not periodically and systematically deal with this matter as in the case of those who do.

HACKNEY.—It is not easy to do justice in the very small space at our command to a report so full and complete as that of Dr Tripe. His reports on the health of Hackney are always replete with interest, both from a sanitary and statistical point of view. Passing over, however, his elaborate comparisons with the figures of former years and other districts—which are in themselves deserving of much careful study—we must perforce pass on to a brief account of the sanitary events at Hackney in 1879. During that year, a total of 6,312 births and 3,285 deaths were registered in the district. The number of zymotic deaths was the smallest ever recorded, the percentage to the total mortality being only 14.6, against 21.6 in 1878, and 20.3 in 1877. The number of deaths under one year was decidedly smaller than in 1878, arising chiefly from the unusually small number of deaths from summer diarrhœa. On this subject of summer diarrhœa Dr. Tripe has some observations of unusual value and interest. Small-pox caused 10 deaths,

measles 81, scarlatina 70, diphtheria 10, whooping-cough 110, fever 47, and diarrhœa 67. The record of sanitary work effected shows that progress is making in a variety of directions. A number of offensive trades have been repressed, dilapidated dwellings improved, cowsheds inspected and supervised, the dust removal given to new contractors, 6,000 of the smaller houses inspected, and a large number of ordinary nuisances removed. Dr. Tripe's careful and comprehensive tables form a noteworthy feature of his report.

HALIFAX.—This is a meagre report for a town with 70,000 inhabitants and a death-rate of 25.4 per 1,000. Considering that the average death-rate for the past eight years has, according to Dr. Ainley's own statement, been at the very high rate of 25.6 per 1,000, the causes of so sustained an excess seem to deserve some special study. The zymotic death-rate was greatly swollen by the mortality from scarlatina, which was very generally prevalent, and which caused no less than 125 deaths during the year. The disease appears to have been greatly spread by the non-isolation of the patients, and the gossiping propensities of the lower classes. Diseases of the respiratory organs were extremely and unusually fatal to the young, the weakly, and the old. A fair amount of ordinary sanitary work seems to have been got through during the year.

HANLEY.—Dr. Swift Walker's report for 1879 is an improvement on that for 1878, but is still deficient in some of the features for which one is accustomed to look in annual reports of health officers. Thus, although the mortality amongst children under one year of age was 35.8 per cent., and the mortality under five years no less than 55.5 per cent. of the total deaths, the figures are reported without comment, and nothing is said as to the causes which have contributed to so disastrous a sacrifice of infant life. Again, although Hanley is not favourably known for its sanitary condition, as its death-rate of nearly 26 per 1,000 will testify, no particulars are given as to the sanitary work effected during the year or as to what has to be done in the future. These are defects which seem to call for some remedy, though it is doubtless only Dr. Walker's reporting, and not his work, that is deficient. The very high death-rate (25.97 per 1,000) is reported to have been due to an epidemic of measles which prevailed in the first half of the year, and which caused 78 deaths. The unusually large fatality of diseases of the respiratory organs and of phthisis helped also, considerably swelling the death-rate. The total number of deaths from zymotic diseases was 154, 11 being from whooping-cough, 5 from scarlet fever, 41 from diarrhœa, and 16 from enteric fever, besides the deaths already spoken of from measles.

The Leather Sellers' Company has voted a contribution of ten guineas to the funds of Mrs. Hilton's *Crèche* and branches, Stepney Causeway. The Cloth-workers' Company recently voted twenty guineas to the same object.

APPOINTMENTS UNDER THE SALE OF FOOD AND DRUGS ACT.—Dr. Ebenezer Evans has been appointed Public Analyst for the County of Anglesey, at one guinea per analysis, *vice* Owen, resigned; Mr. James Napier, F.C.S., has been appointed Public Analyst for the borough of Sudbury, at five guineas per annum and fees; Mr. A. W. Stokes, F.C.S., has been appointed Public Analyst for the parish of St. Matthew, Bethnal Green, *vice* Tidy, resigned.

LAW REPORTS.

COURT OF APPEAL.

TOBIN'S SYSTEM OF VENTILATION.

Ruston v. *Tobin.*

This was an appeal from a judgment of Vice-Chancellor Malins dismissing with costs an action by the plaintiffs to set aside, on the ground of misrepresentation and concealment, an agreement entered into by the plaintiffs in April 1876, for the purchase from the defendant, Mr. Martin Tobin, of a patent obtained by him in March 1873, for the invention of an 'improved mode of ventilating rooms, and of the apparatus employed therefor', and granting the defendant the relief claimed by his counterclaim of specific performance of the agreement. It appeared that in 1876 the plaintiffs, who were ten in number, formed themselves into a syndicate for the purpose of purchasing the defendant's invention, which had then attracted considerable public attention. In March 1876, the defendant was applied to on behalf of the plaintiffs to know on what terms he would sell his interest in the patent. Some correspondence took place, and a deputation of four members of the syndicate was appointed to meet Mr. Tobin. Upon the statements alleged to have been made by the defendant at this meeting, the plaintiffs rested their case of fraudulent misrepresentation by the defendant and concealment of material facts within his knowledge. The plaintiffs alleged that they put several pointed questions to the defendant, and that the answers given by him were in effect that he knew of nothing in any way affecting the validity of his patent, and that he was only aware of two cases of infringement, both of which had been compromised by the payment to him of large sums of money. He also told the plaintiffs that he had personally searched the files of the Patent Office for upwards of 200 years, and that there was no other invention patented which in the slightest degree affected the validity of his patent. He further stated that the patent was of considerable value, and that a great number of applications had been made to him for licences to work it. The plaintiffs, in the belief that the representations made by the defendant were true, agreed to pay him £6,000 and three-eighths of the profits for his patent rights in all but two or three countries where licences had already been granted, but including the right to work it in Belgium and France, which he said he had secured. They alleged that since they had commenced working the patent they had discovered that the patent was in fact void; that numerous cases of infringement had occurred without any attempt being made by the defendant to restrain such infringements; that the defendant knew all along that he could not sustain his patent; that, as a matter of fact, the Belgian patent had lapsed before the agreement, and the French patent was invalid; and that the statements as to the value of the invention and the profits which the defendant said he had made were grossly exaggerated. The plaintiffs therefore claimed to have the agreement cancelled on the ground of the untrue representations which the defendant had knowingly made, and they claimed repayment of the purchase-money. The defendant, on the other hand, denied that he had made any false representations to the plaintiffs. At the time of the negotiations he had numerous offers to purchase his rights, and very many applications for licences to work the patent. He firmly believed at the time, and believed now, that

the patent was valid. He knew of no infringement except the two cases stated; one was the School Board for London, who had compromised the matter by paying him £250, and the other the Portsmouth School Board, who had paid him £30. All the suggestions made as to the validity of the patent in letters and articles which appeared in the newspapers before the agreement was signed were perfectly well known to the plaintiffs as well as to him. He admitted that the Belgian patent had lapsed, but he did not know of the fact before the agreement, and had since offered an abatement in respect thereof; but the French patent had failed through the default of the plaintiffs in not working it in due time. The profits he had made were considerable, and he had not overstated the value. The plaintiffs had had ample opportunities of making enquiries and satisfying themselves respecting all the particulars which he had stated to them. He therefore claimed specific performance of the contract and an account of the profits made by the plaintiffs. In March last Vice-Chancellor Malins, after a trial which lasted fourteen days, dismissed the plaintiffs' action with costs, being of opinion that they had failed to make out any case of fraudulent misrepresentation or concealment on the part of the defendant, and that upon the defendant's counterclaim there must be a decree for specific performance of the contract, so far as it remained unperformed, with a reference to ascertain what deductions ought to be made from the sums remaining unpaid by the plaintiffs in respect of the French patent which was not valid, and the Belgian patent which had lapsed. From this judgment the plaintiffs now appealed.

Lord Justice James was of opinion that the main point was whether there was any real misrepresentation on the part of the defendant at the interview of the 18th of March 1876. The defendant Tobin was at the time in possession of a patent which he thought to be a very valuable patent. It was an invention so simple and easy, in fact, that the wonder was that it had never been employed before. However, Mr. Tobin considered that he was the inventor. It was within the full knowledge of all the parties that the invention had been the subject of much discussion among architects, and had been much commented upon in the leading newspapers. It did not, however, remain unchallenged, as Captain Galton had written to *The Times* on the very day on which an article drawing attention to the subject had appeared in that paper, denying the originality of the invention and insisting on the fact of prior use. Other persons also there were who had in the same way challenged the originality of the invention; and it also appeared that mention was made of a similar invention in a book or pamphlet published in or before 1784. At the time, therefore, when the contract was entered into, the patent was known to be a patent which was impugned on the ground of want of novelty and alleged prior user. At the meeting of the 18th of March, Mr. Tobin, in answer to several questions put to him, replied that he knew of nothing whatever in any way affecting the validity of his patent. All that was meant by him, and all that he was understood by the plaintiffs to mean by that statement was, in his Lordship's opinion, that to the best of his knowledge and belief his patent was a perfectly valid and subsisting patent, and was not capable of being successfully impugned. He was not making a representation to the plaintiffs of all the facts that might possibly be brought against the patent, but the substance of all that he said was that he believed his patent to be a good and valid patent. In his Lordship's opinion there was nothing to raise any suspicion against the defendant of want of truth or good faith in making that statement—except, perhaps, that which occurred in respect of a matter of which the plaintiffs did not know when they commenced their action—*i.e.*, the failure to obtain a patent for the invention in America. Owing to the regulations of the United States and the supervision there exercised over patents, the defendant failed to obtain a patent there because he had been anticipated by a Mr. Culvermann. He was advised, however, by his patent agents that his invention had not really, though perhaps technically, been anticipated, and that in their opinion his patent was good and *bonâ fide*; and to show their sense of its validity they paid him considerable sums of money for licences to use his patent in particular countries. Agreeing, as he did, with the Vice-Chancellor that the defendant was a person of sanguine disposition and, perhaps, unduly confident as to the validity of his patent, he thought the defendant might honestly believe, and had, in fact, satisfied himself, that all these things were idle, and that there was no such case of prior user as would affect the validity of his patent. Then it was alleged that he had, when asked as to infringers, stated that he knew of only two cases of infringement. His answer, however, was that he had tackled the two greatest infringers he had come across—viz., the London and the Portsmouth School Boards, and that they had submitted to acknowledge themselves as infringers and to pay him sums of money. Upon the whole case he was of opinion that the plaintiffs had not proved any misrepresentation by the defendant or any representation on his part which was contrary to fact. They knew what they were buying and that in buying a patent they were buying that which is always a doubtful property and liable to be avoided. As to the statement of profits from the patent made by the defendant, he was also of opinion that the case of misrepresentation raised by the plaintiffs had broken down entirely. With regard to the French and Belgian patents the plaintiffs had not succeeded in proving to his satisfaction any specific representation by the defendant as to these patents. The burden of proof in making these charges rested on the plaintiffs, and in his opinion they had failed to establish any case of misrepresentation. He was of opinion, therefore, that the decree of Vice-Chancellor Malins was right, and the appeal must accordingly be dismissed with costs.

Lord Justice Brett and Lord Justice Cotton gave judgment at some length to the same effect.

THE DISPOSAL OF SEWAGE.

The Attorney-General v. *the Guardians of the Poor of the Union of Dorking.*

This was an action at the relation of Mr. J. C. Deverell, the owner of a mansion in the parish of Dorking, the grounds of which are bounded partly by the Pipp Brook, a natural stream flowing into the river Mole, and partly by the river Mole itself. The relator's house is situated about a mile from the town of Dorking, and the sewage of that town is discharged by various drains into the Pipp Brook, and so into certain millponds intersected by the brook above the plaintiff's house. The sewage of the district has, it appears, rapidly increased of late years, for the population of Dorking has risen from 5,996 in the year 1851 to about 10,000 at the present time, and the object of the action was to restrain the defendants

from causing or permitting the sewage of the town (other than sewage as to which there was a prescriptive right before the commencement of the action) to to be conveyed into the Pipp Brook or the ponds above mentioned, unless sufficiently purified and deodorised and freed from foul matter so as not to create a nuisance. According to the description given by the plaintiff and his witnesses, the condition of the Pipp Brook, which was formerly a trout stream and favourite bathing place, was such that no fish could live in it, and few persons would venture to walk beside it. Sewage could be seen in the above-mentioned ponds floating in masses some yards square; in summer the mud consisted of 'accumulated masses of festering sewage'; there had been outbreaks of typhoid and scarlet fever, and, according to the depositions of the millers at the Pipp Brook, the state of the millponds and stream was 'unspeakably beastly, and few people would care to enter into or minutely describe it'. The defence was that the state of things was not nearly so bad as the plaintiff represented, and that there was, in fact, no substantial nuisance at all; the defendants also contended that they were not the body in whom the sewers of Dorking were vested, and a great mass of legislation was referred to in the course of the arguments on their behalf to show that the sewers in question, being made by the Highway Board, were still vested in that Board. The defendants, moreover, contended that even if these sewers were vested in them, and a nuisance existed, they were not responsible for it, for they had done no act to create or increase the nuisance, they had not themselves made the drains in question, but were only using in the accustomed manner the drains they found in existence when they were constituted a pnblic body; and, according to the authorities, the remedy, if any, of the plaintiff against a Rural Sanitary Authority under the Public Health Act, 1875 (the character in which the defendants were being sued), was not by an action in the Chancery Division, but by the prerogative writ of *mandamus*, which should be sued out in the Queen's Bench Division.

The Vice-Chancellor, in delivering judgment, said the plaintiff's case was founded on this—that the defendants had used the sewers in question without freeing the sewage from noxious matter; and in order to show user by the defendants themselves, reliance was placed upon a by-law passed by them in October 1876, requiring persons erecting new buildings within their district properly to connect the drains thereof with the sewers. That did not, however, authorise any unlawful user of a sewer, nor establish on the part of the defendants such a user as would render them liable to an injunction. In the case of 'Glossop *v.* the Heston and Isleworth Local Board' (*Law Reports*, 12, Chancery Division, p. 102) it was decided that if a Local Board did not act themselves to cause a nuisance, but merely neglected to perform their duty of providing a satisfactory and healthy system of drainage, it was no ground of action by an individual for damages or an injunction, but that the remedy of the individual was by prerogative writ of *mandamus*. In that case, it was to be observed, the sewers were actually vested in the then defendants; and, upon the whole, his Lordship considered that the present case was bound by that decision. The information and action must, therefore, be dismissed, with costs.

LEGAL NOTES AND QUERIES.

MODEL BYE-LAWS ISSUED BY THE LOCAL GOVERNMENT BOARD.

HOUSES LET IN LODGINGS, ETC.

These bye-laws, which are intended for the use of Sanitary Authorities in framing regulations for governing the sanitary condition of houses let in lodgings or occupied by more than one family, are likely to be very useful. In a memorandum prefixed to the bye-laws the necessity is pointed out of defining what is a lodging-house within the meaning of the 90th Section of the Public Health Act. The Board indicate the proper course by advising Local Authorities to fix the rent above which a house let in lodgings will not be brought under the Act, unless the rent of each lodger shall be below a certain minimum, and they refer to the case of 'Langdon *v* Broadbent' (42 J.P., 56) in support of this plan. The cubical space for each person is to be free, that is to say, exclusive of furniture, and shall be 300 cubic feet in each room occupied as a bedroom only, and 400 cubic feet in a room used for living and sleeping; children under ten years of age to be allowed half this space. There are no clauses providing for the separation of sexes, as the Board doubt if this desirable object can be obtained under the ordinary conditions attending life amongst the poorer classes, but if such a bye-law should be required in any district, the Board will co-operate with the Authority in framing it. The bye-laws as to overcrowding are applicable both to landlords and lodgers, and the Board recommend that tickets or placards should be supplied to both, showing the number of inmates which may be received into each room. The landlord must register his house, and furnish particulars as to the number of rooms in the house, and of persons occupying them, to enable the officers of the Local Authority to fix the liability for overcrowding on the right person. The regulations for the construction of water-closets, earth-closets, and privies are very minute and good, and should, as far as possible, be enforced in places where no bye-laws have been made. The proportion of closets to persons is advised to be one to every twelve persons, which might also be enforced throughout the country with beneficial effect. The directions for cleansing the houses, and paving and draining the yards are also satisfactory.

One of the most important set of clauses refers to the action to be taken by landlords and lodgers when any person is ill with an infectious disease in a lodging house. In the first place, both must give written notice thereof to the Medical Officer of Health, and shall, on receiving an order from a Justice for the removal of such person, forthwith take all such steps as may be requisite to secure the patient's safe and prompt removal to a hospital, and adopt all such precautions as they may be instructed by the Medical Officer of Health to take in and about such removal. The wording of this bye-law is very comprehensive, and may throw upon the landlord or lodger the necessity of procuring the ambulance, and taking the infected person to a hospital. It is, however, to be supposed that the Sanitary Authority will clearly define what are the duties of the Medical Officer of Health in these matters, and who shall be the proper person to superintend the removal. Indeed, it must be remembered that by the provisions of the Public Health Act, the order of the Justice may be addressed to such constable or officer

of the Local Authority as the Justice or Local Authority may see fit, so that it would seem to be stretching the Act, if the order were directed to the landlord or occupier of the lodging house.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF COMMONS.

(*January* 24.)

SPURIOUS BUTTERS.

Sir H. MAXWELL asked the President of the Board of Trade what steps, if any, were being taken or contemplated in order to protect British producers from unfair competition caused by the importation from America of spurious compounds resembling and in many cases sold to and by retail dealers as butter; and whether, in view of the rapidly increasing exports of oleo-margarine, suetine, etc., from America to Holland, and the rapidly increasing exports of dairy products by the latter country to England, any safeguards were maintained against the importation of such spurious compounds from Holland.

Mr. CHAMBERLAIN.—The subject to which the question of the hon. Baronet refers has for some time past been engaging the attention of the Board of Trade, and hon. members will have seen a paper which has been printed and circulated giving a considerable amount of information with respect to the manufacture of these butters. It appears from the statement of experts that in the majority of instances these manufactured butters are wholesome, and under these circumstances it is difficult to see how their import could be prohibited, although, of course, if they are imported, it is desirable that they should be imported under their proper names. As to their sale as butters, the Adulteration Acts no doubt would afford a remedy against such practices as those to which the question refers.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

FIELD'S ANNULAR SYPHON.

We trust that you will allow us to lay before your readers an explanation of the misconception to which Colonel Jones's paper, at the Sanitary Congress at Exeter, has given rise, in which he 'especially asks Mr. Rogers Field to bring forward any evidence he can obtain of unscreened sewage having passed through his Annular Syphon without its having been cleaned.' No answer was given. This was owing to the reasons below stated. When these facts were brought before the public, we pointed out to the President of the Section the injustice done to Mr. Rogers Field's invention, and he has kindly allowed us to publish the following statement:—

'As President of the Engineering Section at Exeter, I beg to say that discussion relative to rival Flushing Tanks (at my special request) was not entered into, consequently Mr. Rogers Field only refrained from defending the Flushing Tank designed by himself in compliance with my stipulation.'

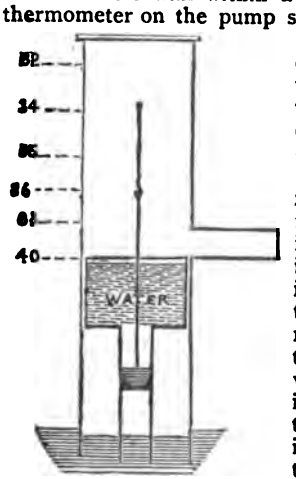
As licensees of the Flushing Chamber fitted with Mr. Field's Annular Syphon, we should wish to state that we have put down several which have been at work for long periods with unscreened sewage, and we also should wish to draw attention to the report on the Annular Syphon, by the Resident Engineer at the Aylesbury sewerage works, in which it says:—'The syphon has now been in full operation for more than five months, and although the sewage passing through it is often very thick, there has never been the slightest failure in its action.'

BOWES SCOTT & READ.
Broadway Chambers, Westminster, S.W.,
13th January, 1881.

A FACT ON FREEZING.

A curious circumstance respecting the recent frost, communicated to me by a friend in the country, may interest some of your readers.

All the pumps on the premises were frozen but one in the stable-yard, which has a glass roof. It was thought that absence from freezing might have arisen from this protection. On January 24th, the day being accidentally selected, a thermometer was placed on the wooden front of the pump, and another on the stable wall within a few inches of it. The thermometer on the pump stood at 18°, the one on the wall at 22°. The top of the wooden case to the pump, which fitted very well, was then taken off; a thermometer when dipped into the water stood at 40°, it was then raised two inches, when it registered 38°; two inches more, 36°; two inches more, 35°; two inches more, 34°; and at top, close to lid, 32°. It may be remarked that the wooden opening, where the handle plays, is very little larger than the handle, thus showing what slight protection will keep out frost, and it is this circumstance that may surprise some of your readers.



It may also be observed that the square leaden receptacle for the water raised by the 'bucket' is about a quarter of an inch from the wood, which may have had a beneficial effect against freezing. The accompanying sketch may further explain.

P. HINCKES BIRD.
1, Norfolk Square, W.

NOTICES OF MEETINGS.

HOUSE SANITATION.

The Council of the Society of Arts offer the following Medals for Plans showing the best Sanitary Arrangements in Houses built in the Metropolis, such plans to be exhibited in the Society's Rooms, Adelphi, in June 1881, and to be sent in on or before 12th May 1881:—1. One Silver Medal for the best sanitary arrangements, carried out and in satisfactory working, in a house let out in tenements to artisans, for which a weekly rental is paid. 2. One Silver Medal for the best sanitary arrangements, in actual working, in a house of the yearly rental of £40, or less, to about £100 in value. 3. One Silver Medal for the best sanitary arrangements, in actual satisfactory working, in a house of the yearly rental value

of £200 and upwards, to any amount. 4. The houses must be open to the inspection of the Judges, who, in considering their award, will be guided by the suggestions of plans for main sewerage, drainage, and water-supply, made under the Public Health Act, 1875.* The houses must have been in actual occupation within the last three months, and a Certificate must be given by the occupiers, on a printed form, stating the satisfactory working of all the sanitary arrangements, such form to be obtained at the Society of Arts. 5. The houses may be old, fitted with modern sanitary arrangements, or may be new. They must be within the metropolitan area of the Board of Works. 6. The sanitary arrangements must include the conditions for good water-supply, drainage, warming, and ventilation of the house, and precautions taken against frost. 7. The medals may be awarded to the occupiers of the houses, or the lessees, or the owners. 8. The plans must consist of a ground plan and sections, to the scale of not less than one inch to five feet; details of not less than one inch to the foot. The plans may be accompanied by specifications. 9. The names of the architects, surveyors, or sanitary engineers who directed the sanitary arrangements, should be given, and Certificates will be awarded to those whose plans obtain the Medals.

Communications should be addressed to Mr. H. TRUEMAN WOOD, Secretary.

DOMESTIC ECONOMY.

1. The Council of the Society of Arts, will hold a Third Congress on Domestic Economy, at the Society's Rooms, in the Adelphi, London, during the present year. 2. The Council offer Seven Bronze Medals and Certificates of Merit for Papers (not exceeding 1,000 words), written by Teachers of Public Elementary Schools and Training Colleges, which shall give an account of the best method practised by the teacher, of the teacher's experience, and the result of the teaching, in any one or more of the seven classes of subjects named below. (i) clothing and Washing; (ii) The Dwelling—Warming, Cleaning, and Ventilation; (iii) Rules for Health—The Management of the Sick Room, Cottage Income, Expenditure and Savings. The Second branch includes—(iv) Food: Its Composition and its Nutritive Value; (v) Food: Its Functions; (vi) Food: Its Preparation and Culinary Treatment (*i.e.*, Practical Cookery) (§ 24). 4. Only one medal will be given to a teacher, but the subjects taught successfully will be inscribed on the one medal and a certificate given. 5. The papers must be sent to the Secretary of the Society of Arts by the 1st May next. Each paper must be enclosed in a sealed envelope, bearing a motto, and must be accompanied by an envelope bearing the same motto, and having within it the writer's name and address. 6. No medals or certificates will be awarded if the papers are not of sufficient merit to deserve them.

Communications should be addressed to Mr. H. TRUEMAN WOOD, Secretary.

THE SANITARY ASSURANCE ASSOCIATION.

The Board of Trade have provisionally approved the Memorandum and Articles of Association under which the Association is to be incorporated, and the following gentlemen have been elected on the Honorary Council:—Sir Richard Temple, Bart.; Sir Garnet Wolseley, K.C.B.; R. Brudenell Carter, F.R.C.S.; Andrew Cassels; Arthur Cates, F.R.I.B.A.; Dr. R. Farquharson, M.P.; Professor E. Frankland, F.R.S.; Captain Douglas Galton, C.B.; R. B. Grantham, M. Inst. C.E.; Hon. Chandos Leigh; J. Norman Lockyer, F.R.S.; Professor John Marshall, F.R.S.; Dr. W. S. Playfair; Dr. G. V. Poore; Professor G. Rolleston, M.D.; Geo. J. Romanes, F.R.S.; Wm. Spottiswoode, Pres. Roy. Soc.; H. P. Symonds, F.R.C.S.; Major H. Tulloch, R.E.; Professor John Tyndall, F.R.S.; John Whichcord, Pres. Roy. Inst., B.A.; and Colonel Yule, C.B.

* The Public Health Act has been revised to 1878, and is published by Her Majesty's Stationery Office. Price, with plans, 3s.

SANITARY INSTITUTE OF GREAT BRITAIN.

At a Meeting of the Sanitary Institute of Great Britain, B. W. Richardson, M.D., F.R.S., in the chair, eight Fellows were elected, among whom were the Bishop of Exeter, Sir Stafford Northcote, General Bartlett, and Colonel G. E. Waring, jun., U.S. America. Two members were also elected, and applications read for election at next meeting.

At a Meeting of the Sanitary Institute of Great Britain, held January 27th, B. W. Richardson, M.D., F.R.S., in the Chair, one Fellow and two Members were elected.

Ordinary Meetings for the reading of Papers and Discussion upon sanitary matters, will be held, during 1881, on the second Wednesday in the months of April and June. Chair to be taken at eight o'clock precisely.

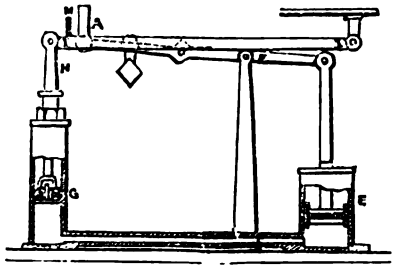
SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, February 18th, at 7.30 p.m. The minutes of the last meeting will be read. Correspondence. A letter from Miss Frances Johnstone, manager of the Hastings and St. Leonard's Sanitary Aid Association. A communication from Dr. B. W. Richardson, suggesting the appointment of a Committee to co-operate with Professor Gladstone and himself, on the subject of the prevention of the spread of infectious diseases by means of the School Board schools. Dr. Billings, Surgeon-General, Washington, U.S., will be balloted for as an honorary member. Mr. Shirley Murphy will make some remarks on the causes of the present diffusion of small-pox, and the means which should be adopted for its prevention. A paper will be read from Dr. R. H. Bakewell of Hokitika, New Zealand, entitled 'Some Colonial Sanitary Lessons'.

ILLUSTRATED SANITARY PATENTS.

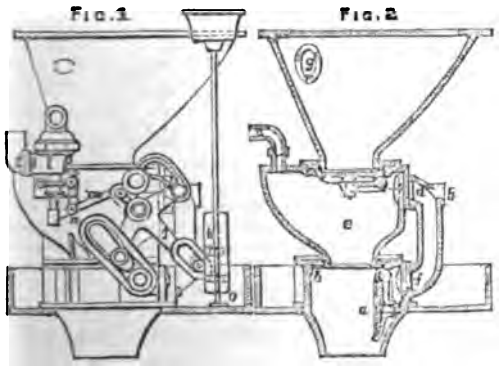
1988. WATER-CLOSETS, ETC.: S. B. GOSLIN AND J. J. BROWN, LONDON.—In order to prevent more than a given quantity of water from being delivered, the 'pull-up' handle, instead of being connected directly to the lever controlling the water-supply, actuates it by the mechanism shown in the illustration, where A represents the rod depending from the handle, and M the lever which regulates the water-supply. When the rod A is raised, it causes the piston in E to descend, and to lift the piston in G, which, through rod H and lever I, raises the lever M, and turns on the water. Should the handle of the closet be kept open for a considerable time, the piston in G would slowly descend, release the lever M, and so turn off the water, the liquid in the cylinder passing from the under to the upper side of the piston through a small valve O opening upwards. When the handle is afterwards put down, the

liquid above the piston will be sucked downwards through the larger valve, which opens downwards. (2) In ball-cocks the valve-seat is formed at the end of a short neck fixed to the supply-pipe, the whole mechanism being carried



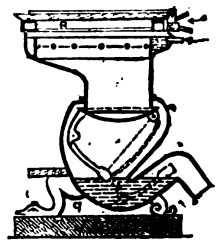
by the shell or body of the cock, which can be thus conveniently unscrewed for repair. (3) Screw-valves are made with the valve connected to the screw by a loose connection to prevent its revolving with the screw when pressing upon the valve-face. (May 14, 1880.)

1933. APPARATUS FOR REGULATING THE FLOW OF WATER, ETC.; F. P. PRESTON, J. T. PRESTIGE, AND E. J. PRESTON, DEPTFORD, KENT.—Relates (1) to the construction of single and double valve ships' water-closets as described in Specification 4844 of 1876. The passage between the self-acting overflow valve and the closet-pan is tapered, the larger end being at the closet-pan, by which arrangement it is possible to use a larger strainer, and to make it flush with the inside of the pan instead of projecting inwards as heretofore. (2) The supply-valve for such closets is of a conical or curved form, so that it finds its bearing in almost any position with regard to the seating, whereby no raised seating is required. (3) Sometimes a valve is used in connection with a horizontal spindle, and hinged to the interior of the valve-box. (4) Closets with horizontal and parallel upper and lower pan-valve seatings are constructed as shown in the illustrations. In fig. 2, *a* is the lower valve; *b* is the lower valve seatings; *c* is the ventilating air pipe; and *d* the overflow pipe from top chamber *e* with valve *f* at bottom to prevent back-wash; *g*



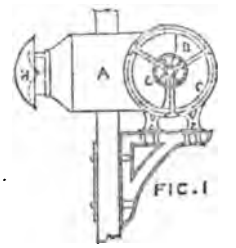
is the overflow-valve grating, mentioned under head (1); *h* is a ploghole. Fig. 1 illustrates the method of working the closets; *j* is a slotted lever; *k* the weight with pin which slides up and down on the guide standard *o*; *l* the supply-valve; *m* lever working same with fulcrum *n*. (5) For closets under the water-line of the ship a double-acting pump is used, with its valve-chamber placed directly under the pan. The details of the arrangement form the subject of seven illustrations in the specification, which further relates to (6) supply-valves with ball-cock levers, (7) to ball-valves, and (8) to waste-water preventing apparatus. (May 11, 1880.)

2019. WATER-CLOSETS: W. R. LAKE, LONDON.—According to this invention closets are made with fixed and with movable traps. The closet shown is of oblong narrow-shape, with a perpendicular rear surface. The ring R is made hollow so that warmth may be imparted by hot air or water. The apparatus is supported by legs *q* which



may be screwed to the floor or any foundation *s*. (May 18, 1880.)

2039. VENTILATORS FOR EXHAUSTING, FORCING, OR COMPRESSING AIR, GASES, ETC.: J. HOWORTH, FARNWORTH, LANC.—Relates to an Archimedian screw-exhauster or blower, applied vertically or horizontally, and worked by motive power, or by the action of the wind. The apparatus consists essentially of a cylinder within which the Archimedian screw revolves. In some cases a fixed hood-cover or disperser is used in lieu of the revolving hood usually employed. For cooling, dyeing, moistening, or impregnating the air, it is passed through saturation boxes containing the necessary liquid or vapour. The illustration shows one form of ventilator, and also the saturation box. The screw B is carried by shaft C^1, and driven by steam or other power by means of pulley C. The cylinder A projects through the wall of the building, and terminates in a fixed cap or hood H. According to the direction in which the screw is rotated, the apparatus can be used as an exhauster or blower. The saturation box H (fig. 2) is made of iron plates formed in zigzag or corrugated shape, in order that



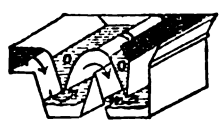
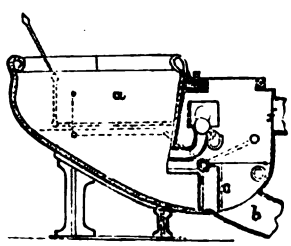


FIG. 2

the air admitted at M may be caused to impinge upon the liquid at N before it is discharged at N^1. The interspace O may be filled with hot or cold water, or it may be arranged as a steam chamber. (May 19, 1880.)

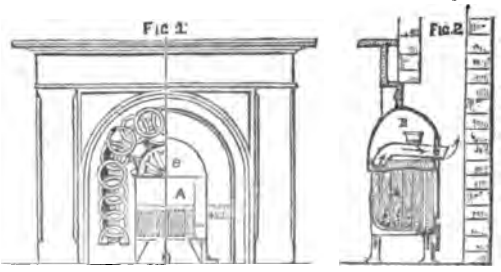
2048. CISTERNS, WATER-CLOSETS, ETC.: T. JEWELL, LONDON.—The ironwork is covered with black oxide and



then coated with Spence's metal, 'or other effective metal', to prevent corrosion. The illustration is a section of a water-closet, in which *a* is the pan, *b* the soil pipe, *c* the

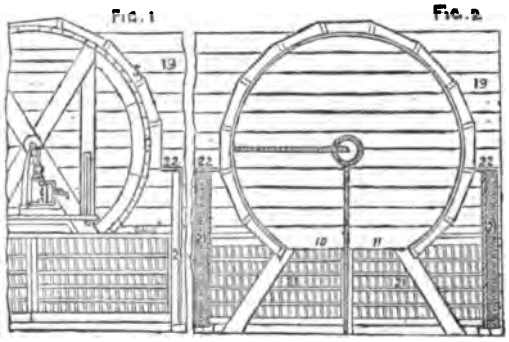
valve, *f* a ventilating pipe. The inventor also describes other forms of closets, sinks, and ventilating cowls, but he does not specify what are the points of novelty. (May 20, 1880.)

2054. FIREPLACES AND STOVES: H. WITHINGTON, LONDON.—This invention is applicable to domestic fireplaces, cooking ranges, and stoves, and consists in placing



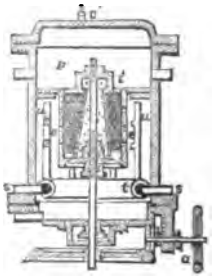
a firebrick tile above the fire, and drawing off the products of combustion at the front edge thereof. A is the grate, *c* the cover firebrick cover plate, *e* the flue, B a hot-air chamber. (May 20, 1880.)

2051. VENTILATING APPARATUS: W. CUNNINGHAM, DUNDEE.—Relates to the ventilation of buildings by apparatus constructed on the principle of that described in Specification 3621 of 1875. Fig. 1 is a side elevation, and fig. 2 a cross section of the ventilating machine, which externally resembles a horizontal cylinder partly embedded in a rectangular box, which forms the lower part of the structure. The cylinder 5 consists of a cylindrical shell formed by longitudinal staves built upon circular ends. It does not form a complete cylinder, there being an open space at the bottom, which is divided into two openings, 10 and 11, by a vertical partition, which also divides the lower part of the valve chamber into two compartments, and extending up inside the cylinder, forms an abutment separating the



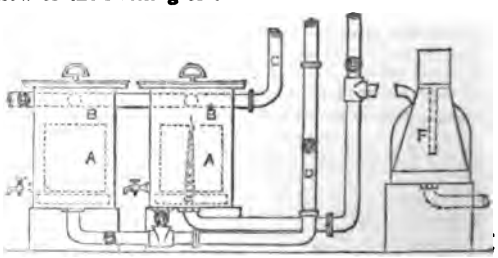
space on one side of the radial piston 6 from that on the other side thereof. The travel of the piston is from the outer edge of one opening 10 to the outer edge of the other opening 11, and *vice versâ*, drawing in and expelling the air alternately through each opening 10 and 11. The lower parts of the ends, and the whole of the sides of the lower rectangular part of the structure, are occupied by the inlet and outlet valves, there being inlet valves at one end occupying half the side of each valve chamber, and outlet valves at the other ends occupying the other halves of the sides. Externally, the space is divided by a vertical partition 19 placed transversely at the middle of the length of the cylinder, so that all the inlet valves are at one side, and all the outlet valves at the other side thereof. The valves consist of horizontal strips of a light impermeable cloth, fixed by their upper edges to rectangular frames 21, secured by hooks or catches 22. (May 20, 1880.)

2131. FILTERING APPARATUS: G. H. MOORE, NORWICH, CONNECTICUT, U.S.A.—As will be seen from the illustration, the walls of the filtering cylinder *e* are perforated, the inner surface being coated with the strainer *h* of fine wire cloth or similar material. The loose filtering material is contained in the chamber formed between the 'compressor' *i* and the conical 'compressor' *j*, both capable of being moved in opposite directions in cylinder *e* by means of handwheel a^1 and the intermediate gearing; and the



fluid is filtered by passing from the outside of the filtering cylinder into the inside of the conical compressor, whence it is led through perforations in the upper compressor into the chamber *p*. The unfiltered fluid enters the filter through pipes *s* leading into the annular chamber *t*, from which it is distributed by pipes *u* with outlets *v* so directed as to give the current a rotary motion, whereby an agitation of the water is maintained which retards the clogging of the filtering material; c^1 is an indicating rod to show the degree of compactness of the filtering material. (May 25, 1880.)

2072. DISINFECTING VAN MOHAIR, ETC.: J. C. RAMSDEN, HAMPSTHWAITE, YORKSHIRE.—Bales of van mohair, wool, or of other fibrous substances enclosing poisonous matters are placed in an air-tight vessel, and, a vacuum being created in it, disinfectant gases or liquids, such as Condy's fluid, etc., or superheated steam, is injected into the bales. A suitable apparatus for the purpose is shown in the illustration, where A A are two bales of wool or hair in air-tight chambers B B, which should be large enough to allow of the swelling of the bales under the action of the



vacuum. The air is exhausted by any suitable apparatus through pipe C, and the disinfectant is introduced from an elevated cistern through pipe D. In the right-hand vessel is shown a perforated tube, which is sometimes used to penetrate the bale and bring the disinfectant more readily to its centre, the disinfectant being introduced either from a cistern placed above or by means of a force pump or blower shown at F. (May 21, 1880.)

SANITARY INVENTIONS.

ABSOLUTE SAFETY FROM KITCHEN BOILER EXPLOSIONS.

A correspondent writes to describe an apparatus for preventing the kitchen boiler explosions which were so fatally frequent during the late severe frost. He claims for this apparatus that it fulfils all required conditions, distributing hot water to all parts of the house at any time during night or day with perfect safety; explosion, in fact, being rendered practically impossible.

The system described was first introduced into England by the patentee in the year 1868. Its

chief feature, and that which renders it thoroughly efficacious, is the substitution, beside the boiler, of a cylinder, furnished with a safety valve instead of the usual hot-water circulating cistern upstairs. The points of this system will, however, be better appreciated by the perusal of a detailed description with reference to a diagram.

At the top of the house (see Figs. 1 and 2) is placed a cistern, A, from which a supply of water is laid on direct to the cylinder, C, and to the boiler, B, which is of small size and preferably tubular. This boiler is in connection with the cylinder, and has an ordinary flow and return. The small junction at K is inserted in case of any emergency, such as for instance when the water in the cylinder may have become evaporated down to this point. It would, however, take many weeks to achieve this.

From the top of the cylinder, and also from the boiler direct, the hot water is caused to circulate throughout the house and back again to the boiler, supplying all the various draw-off taps on its way. By this means, hot water is rendered accessible immediately, without waiting, as is usually the case, to first empty the pipes of the cold water lying dormant in them. The cylinder C, which can be made of any size to contain from fifty gallons upwards, thus takes the place of the dangerous hot water cistern usually

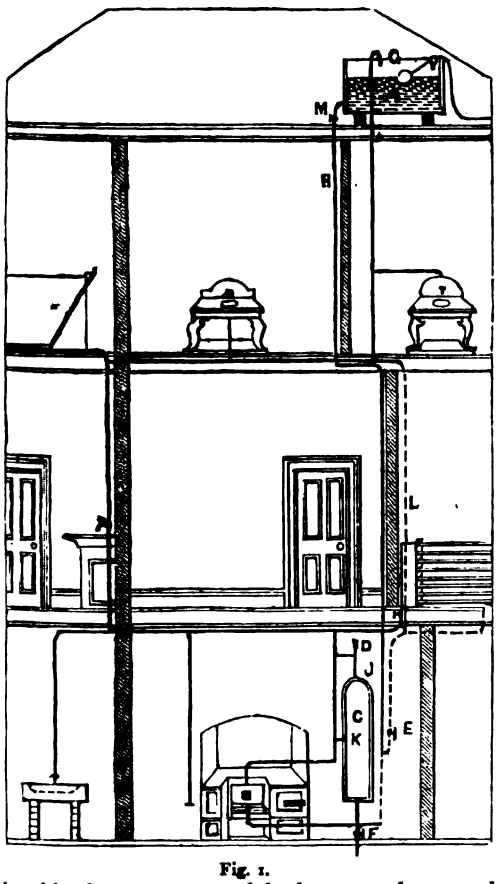


Fig. 1.

placed in the upper part of the house, and serves the double duty of a reservoir and a safeguard. On the top of the cylinder, a safety valve, D, is fixed, which consists simply of a dead weight, faced with india-rubber, placed over the open end of a pipe in direct communication with the cylinder. Weights are added according to the head of water which has to be resisted. Besides this valve, there is also the ordinary expansion pipe, G, placed at the highest part of the apparatus. In the return pipe at E is placed a valve, the object of which is to stop the circulation round the house during the night, and so as to allow of the water in the cylinder being kept hot, ready for use in the morning, without waiting to have the fire lighted in order to obtain hot water. In furtherance of this object, the cylinder is packed with felt composition. The valve at E is placed there only for convenience, and no danger would accrue to any neglect of turning it off at night, or on in the morning; the only consequence in the latter case being the trouble of waiting for the cold water in the pipes to spend itself before the hot arrives. At N in the supply pipe from the cistern, is placed a valve for shutting off cold water from the apparatus, thus allowing all upper pipes to be emptied in case of severe frost. The cylinder would be still full, the circulation being confined to this and the boiler. In case of necessity, as for instance during repair, the whole apparatus could be emptied by means of the sluice cock at F.

Another great advantage of this system consists in the fact that the water can be made to circulate through hot water heating coils anywhere in its circuit. There is also no necessity for two boilers behind the kitchen fire, one a high pressure boiler for baths, lavatories,

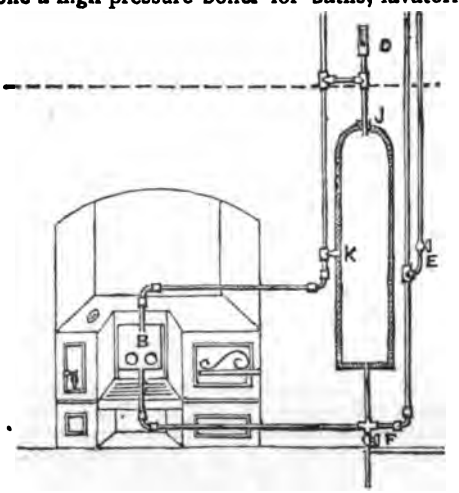


Fig. 2.

and sinks upstairs, and a low pressure boiler besides, for the scullery service or basement service, because the boiler in connection with the cylinder serves all purposes. In conclusion, it may be mentioned that this system is simply perfect as regards enjoying an immunity from explosions. It is impossible to draw off water below the dotted line shown at fig. 2, between the safety valve, D, and the cylinder top at J, and therefore, the kitchen fire can be kept up in full action without heed of frost. The cylinder can be fitted to any close or open range whatever. The patentee and sole manufacturer is Mr. F. Dyer, of 66, High Street, Camden Town, London, N.W., who first introduced this improved system into England.

Sanitary affairs in Plymouth are stated by the *Western Morning News* to be in an intensely unsatisfactory state. A large number of complaints have been lodged against the contractors.

EXPERIMENTS AT THE LONDON CUSTOM HOUSE WITH BOYLE'S SYSTEM OF VENTILATION.

THE Long Room of the London Custom House—one of the largest rooms in London—has recently been ventilated by Messrs. Robert Boyle and Son, ventilating engineers of London and Glasgow, under the direction of her Majesty's Office of Works; the system applied by them being a combination of their well-known air-pump ventilators and vertical tube air-inlets. As the Long Room of the Custom House has long been notorious for being one of the worst ventilated rooms in London, and was officially reported so to be by Professor Faraday and Dr. Else so far back as thirty years ago, considerable interest has been displayed amongst those skilled in sanitary science as to the result of Messrs. Boyle's efforts to remedy the evil. Accordingly, on the completion of the work, a series of experiments were instituted to test the efficiency of the system; these experiments extended over five days, beginning on Wednesday the 5th ult., and terminating on Monday the 9th. A large number of scientists attended those experiments, amongst whom were Dr. B. W. Richardson, F.R.S., Captain Douglas Galton, C.B., F.R.S., Dr. Corfield, Sir John Monckton, Town Clerk, Ernest Turner, Esq., Rogers Field, Esq., C.E., and Bailey Denton, Esq., C.E. The room is 194 feet in length, 60 feet wide, and 54 feet in height, and is lighted by about 200 large argand burners, fixed at about the level of the head. When the gas was lighted, owing to the position of these burners, the heat and sulphurous vapour was intolerable, and the source of great discomfort to the occupants of the room. The heating arrangements consisted of two large double open stove fires placed in the centre of the room. The number of the clerks employed in the room is about 140, and there is a constant influx of the public having business with the department. Messrs. Boyle have fixed six 3 feet diameter air-pump ventilators on the roof, which are connected with the interior of the room by means of an iron shaft 18 inches diameter, led down from each to an opening in the centre of the ceiling, an iron one, of the same diameter as the pipe. These shafts equally divide the ceiling. For the admission of air there are twelve vertical tubes, each 10in. × 8in., placed in the bays of six of the windows on the south side of the room, and communicating with the outer air through openings 2 ft. × 1 ft. cut in the wall under the centre of each window; these are the only air inlets to the room, as it was not considered advisable to admit air from the north side, taking into consideration the odoriferous character of the atmosphere usually found in Thames Street. On testing the air-tubes, an abundant supply of air was found to be passing into the room.

Proceeding to the roof, the air-pump ventilators were then tested, and on Wednesday were found to be extracting at the rate of 800 cubic feet per minute, making a total for the six of 4,800 cubic feet, or 288,000 cubic feet per hour. The wind was N.E.E., an unfavourable direction for the ventilators, and putting them to a severe test, the air inlets facing the south. On Thursday forenoon the ventilators were extracting 900 cubic feet per minute; total for the six, 5,460 cubic feet, or 324,000 cubic feet per hour; wind in same direction, but strong. Thursday 4.45 p.m., tested by Dr. Richardson—extracting 1,347½ cubic feet per minute; total for six, 8,085 cubic feet, or 485,700 cubic feet per hour; wind in same direction, but strong.

Friday, experiments conducted by Prof. Corfield and Mr. Rogers Field. Ventilators extracting 612½ cubic feet per minute; total for six, 3,675 cubic feet, or per hour 220,500 cubic feet; wind N.E., fluctuating average speed as tested by Mr. Rogers Field, 525 ft.

Saturday, experiments conducted by Mr. Ernest Turner, F.R.I.B.A., and Mr. Bailey Denton, C.E. Ventilators extracting 595 cubic feet per minute; total for six, 3,570 cubic feet, or 214,200 cubic feet per hour. Wind N. and very light, the most unfavourable direction for the ventilators, added to which the room was almost air-tight on the north side, on which side alone the wind blew; and Mr. Turner had caused all the air-inlets on the other side to be closed, so that the action of the ventilators under such conditions, and in spite of the enormous fires burning in the room, necessarily causing a great suction towards them and away from the ventilators, was the more remarkable. On comparing the action of the ventilators with the room in this closed state with their action when the inlets were open, a difference of 25 feet per minute only in each ventilator was discernible. The temperature in the room was 60 deg., and outside about 40 deg. On Monday, the 10th, the ventilators, owing to the dull, cold, foggy weather, were put to a most severe test, the instrument showing that the ventilators were each drawing 560 cubic feet per minute, or 3,360 for the six, or 201,600 per hour; and it is interesting to notice in connection with this day that between the hours of seven and eight, when a dense fog prevailed outside, the atmosphere of the Long Room remained quite clear, and continued so throughout the day.

During the whole of the experiments there was not the slightest down-draught discernible in the air-pump ventilators, even when all the inlets were closed. All those present at the experiments expressed themselves highly satisfied with the results obtained.

With regard to the improvement which the introduction of Messrs. Boyle's system has effected in the atmosphere of the room, those occupying it testify to the fact in the most marked manner, one gentleman, who has been for over thirty-four years engaged in the room, giving the strong testimony that, compared with the past, the present condition of the room was as Heaven to the nether regions.

Messrs. Robert Boyle and Son are to be congratulated upon the success they have achieved, and the London Custom House may justly be added by them to the long list of public buildings which they have ventilated in a satisfactory manner.

PORTWAY'S PATENT SLOW COMBUSTION STOVE.

Close stoves have always formed an important item in our heating arrangements, and can scarcely be considered as occupying even a secondary position to the open fire-grate, as their presence is often found necessary in dwelling houses, while the numerous uses to which they are applied, render them of considerable utility. At present, much progress has not been made in producing smoke-consuming stoves of this character, but we fortunately possess several examples, built on the slow combustion principle, of a meritorious character. The close stove appears to us to offer more favourable features for adoption as a smoke consumer than the open fire-

grate, and as recent experiments with anthracite coal has proved that many of them will readily burn that fuel, without any alteration in their arrangements, they are, so to speak, at once placed in that category.

A 'line' of stoves that are rapidly increasing in public estimation, are 'Portway's Patent Slow Combustion', very appropriately named 'The Tortoise', invented and made by Mr. Charles Portway, Halstead, Essex.

They have the advantage of being manufactured in several sizes, and of both plain and ornamental designs, which render them suitable for any sized apartment, from a harness room to a place of worship. The smallest, of the plain character which our illustration depicts, is only twenty inches high and nine inches in diameter, but it has a heating capacity of about 2,000 cubic feet, and may be removed easily by a man from room to room, if required for use in different places. They are simple in construction, the interior, including the bottom, being composed entirely of Stourbridge ware, which gives the greatest amount of heat with the smallest consumption of fuel, the outer parts being of iron. The clay interior is calculated to last several years, and is necessarily the only wearing part, and this can be replaced at any time by an ordinary mechanic, at a trifling cost. By a peculiar flue arrangement, all sulphur fumes are carried off, rendering them perfectly safe for heating conservatories, etc. They are fed from the front towards the top, and the amount of heat is regulated by the bottom door, the smallest sized one burning for many hours without attention, and being built on the slow combustion principle, gives off but a trifling quantity of smoke. Our next

illustration represents the 'Tortoise' in its more ornamental character, suited for the halls of mansions, etc., the one being of open ornamental iron-work, and the other a combination of the same with plain or ornamental tiles. They are so arranged that the fire-clay interior can be easily removed if necessary. Another form in which the 'Tortoise' is made, is that of a laundry stove. Our drawing represents the second size, which will heat ten irons. Several sizes are made, and the same principle of heating, as in

the other examples we have quoted, are strictly adhered to. The smaller ones are adapted for the use of private families and the larger for laundresses, schools, public institutions, etc. All these stoves burn coke, or almost any rubbish unfit for the ordinary fire, and recent exhaustive experiments made with anthracite coal, has proved that this fuel can be burnt in them successfully and at an almost infinitesimal cost.

BARNARD, BISHOP AND BARNARD'S SLOW COMBUSTION STOVES.

In view of the great interest now attaching to the subject of the combustion of coal and heating of houses, we are preparing an extended review of the famous combustion stoves of Bishop and Barnard, which have just now a reputation stamped by an enormous practical experience of the many thousands who have employed them, as well as by the highest awards at various exhibitions. Anthracite and smokeless coal burns perfectly in these stoves, as we have had occasion to see on more than one occasion, and as may be now witnessed at the Alexandra Palace, where a handsome display of these artistic stoves may be seen in use. We recommend all who are interested in this subject to pay a visit to the Alexandra Palace, or to Messrs. Barnard and Bishop's show-rooms in Queen Victoria Street, where the anthracite may be seen burning in two slow combustion stoves with the utmost perfection.

A BATCH OF INVENTIONS.

We have recently inspected a number of useful inventions due to Mr. J. F. Clarke of 49 Moorgate Street, E.C. The first which attracted our attention was his patent self-flushing and water-waste preventing water-closet. The speciality of this is that it is so arranged that when the flap of the seat is raised it locks the water-closet door, by means of a bolt, and at the same time raises the valve, in the supply-cistern over it, by means of a cord or chain and pulleys, and fills a flushing-box, which holds just sufficient water to flush the pan. When the flap of the seat is shut, it unfastens the bolt of the door, and also shuts the valve in the supply-cistern and opens the one in the flushing-box, which flushes the pan, so that unless the flap is shut the door cannot be opened; consequently, the pan is flushed each time the water-closet is used.

Another very useful invention is Mr. Clarke's patent portable hydrant for watering and cleansing public thoroughfares, extinguishing fire, and other purposes. These hydrants would be useful to keep at the police and fire escape stations and other places, so that they could be used on the first alarm of an outbreak of fire, without the necessity of waiting the arrival of turncocks or engines.

In passing through Mr. Clarke's varied collection of useful novelties our attention was attracted by some French tiles of compressed concrete with the designs inlaid. The appearance and designs of these tiles leave nothing to be desired, and they have also the special excellencies of perfect level of surface and of margin, intense hardness, and cheapness.

Their durability is almost unlimited. It is stated that seven years' street-traffic in the Rue Vivienne, Paris, has not affected them. Mons. Larmanjat, the patentee, has gained ten prize medals, culminating in the first prize in the Paris Exhibition of 1878. These tiles have been laid in various public institutions and private houses in London, and in several churches in different parts of the country.

Mr. Clarke contributed his quota towards solving the vexed question of removing the snow after the storm of January 18, by the invention of an apparatus which was tried at various points in the City of London. It consists of a series of metal plates placed in an inclined position, one above another, directly beneath the manhole, so that the snow therein deposited falls upon them. Beneath each plate are atmospheric gas-burners, by which they, as well as the space between them, are heated, the burners being supplied with gas from an adjacent main. An air-shaft, communicating with the outer air, is provided for ventilation. Flues are also fixed to carry the heat from the spaces between the heated plates to the manhole-shaft, so as to operate on the surface of the snow placed therein. One labourer only is required to work this apparatus, to rake the sweeping from the plates when the snow is melted, the resultant water running direct into the sewer. It is claimed by the inventor that, if this apparatus were fixed in principal thoroughfares, the streets would be cleared of snow in a few hours, with a minimum of labour and expense.

DIETETIC NOVELTIES.

PURE FOOD COMPANY'S PRODUCTS.

We have received from the Pure Food Company, 4, Princes Street, Red Lion Square, Holborn, a series of new articles of diet to which we are giving our attention, and which will have more detailed subsequent notice; meantime, so far as our trials have gone, we are able to speak of them with unqualified favour. They are manufactured with great skill, with evident and unusual chemical knowledge and appreciation of the laws of nutrition, as well as of technical details. Of the coffee essence in particular, we may speak as having furnished the very best cup of coffee that we have ever tasted made from an essence. In fact, it is very difficult, if at all possible, for a careful judge to distinguish a cup of coffee made with boiling water, to which some of this essence has been added, from a cup brewed fresh from the berry. The process is, we believe, a new one, and it has certainly attained an unequivocal and hardly to be anticipated success. The extracts of meat are excellent also, retaining the albuminoid constituents of the meat; they are nutritious in the true sense, as well as stimulating and palatable. The beef lozenges are, in our opinion, open to improvement. They are at present too hard, and the flavour of the meat not perfectly preserved. This Company's milk for children and invalids we are having tested. Its composition is excellent.

LENTILLA.

Mr. Ernest Hart, in his article on the 'Hygiene of Food', SANITARY RECORD, Jan. 15th, 1880, enlarges on the value of cereal foods, which are by far too much neglected in this country. Since then, he has had opportunities of trying Messrs. James's Lentilla as a daily food, and has become convinced both of its nutritive value and of its palatable character. A careful trial of it as a thickening for soups, for puddings, rissoles, and other sweet dishes, prove it to be certainly one of the best foods ever introduced. The well-considered combination of other ingredients with the lentil flour, removes any possible objection to it; the puddings and sweet dishes prepared from it making unequalled food for invalids and children. An admixture of Lentilla adds greatly to the value of hominy or oatmeal porridge, for breakfast, as recommended in Mr. Hart's article above referred to.

SANITARY JOTTINGS.

The Garden quotes a statement made by Mr. Medhurst, a British official in China recently, that 53,000 lbs. of willow leaves were being made ready to be mixed with teas at one port alone. ——On December 28th, the Nestfield Club and Coffee Tavern was opened at Darlington. One of the most gratifying features which belongs to the many coffee taverns which have been recently established in the large towns in the north is the almost uniform success, financial and otherwise, which (when under proper management) is alleged to have followed their inauguration.——The prize of £50 offered by Dr. Frankland, and an Associateship of the Institute of Chemistry coupled with this premium by the Council, 'for the best original investigation involving gas analysis', has been awarded to Mr. Frank Hatton, a student of the Royal School of Mines.

The Land League principles seem to be spreading into Irish sanitary affairs. We read in the code of rules issued by the Dundalk 'House League': 'That if premises are not in a sanitary state, and are calculated to injure the health of the occupiers, *no rent is to be paid* until such premises be improved, and certified by the sanitary officers as having the necessary accommodation suitable for sanitary purposes. The remedy is heroic, and perhaps not undeserved by the offenders; it is questionable, however, if the times are yet ripe for so simple a proceeding, especially in England.

APPOINTMENTS UNDER THE PUBLIC HEALTH ACT.—Mr. Alfred Green has been appointed surveyor to the Corporation and Urban Sanitary Authority of Lancaster at £250 per annum, *vice* Hartley, resigned; Mr. William Turnbull has been appointed surveyor to the Tipton Local Board and Urban Sanitary Authority, at £180 per annum, *vice* Jepson resigned; Mr. Thomas Caink has been appointed Surveyor to the Teignmouth Local Board and Urban Sanitary Authority, at £163 16s. per annum, *vice* Turner, resigned; Mr. W. Welburn has been appointed Surveyor to the Middleton and Tonge Improvement Commissioners and Urban Sanitary Authority, at £150 per annum, *vice* Bayley, resigned; Mr. J. H. Fingland has been appointed Surveyor to the Haslingden Local Board and Urban Sanitary Authority, at £150 per annum, *vice* Bretherton; Alfred Thomas Townley, L.F.P.S. Glasg., and L.M., has been appointed Medical Officer of Health for the Oswaldtwistle Urban Sanitary District, Lancashire, for one year, *vice* Booth, deceased; Mr. W. Graham, Higher Townley, Middleton, near Manchester, has been appointed Medical Officer of Health for the Middleton District, *vice* Mr. Knott, resigned; Dr. John Ward has resigned his appointment as Medical Officer of Health for Cockermouth and Workington Urban Sanitary Authorities; his successor is not as yet appointed.

ORIGINAL PAPERS.

HOT-AIR STOVES AS HOUSE WARMERS.

By W. O. MARKHAM, M.D., F.R.C.P.

HOT-AIR stoves as dwelling-house warmers are at a discount in this country. As a rule, we insulars abhor them, as nature does a vacuum; the bright coal fire, as lauded by romancists, and sung by poets, is naturally to us a delight. The result is, that Englishmen really know very little about this method of warming; and that with them condemnation of it has preceded trial. Prejudice does not distinguish. It does not stop to enquire whether there are stoves and stoves, stove-warming and stove-warming; but judges from a limited and unfortunate acquaintance with the thing, as made, perhaps, in a Swiss châlet, or in a Canadian or Russian log-hut. Education, therefore, will be required by the Englishman, assisted probably by a strong rise in the price of coals, to reduce or remove his prejudices on this head.

Now, I hold this general dislike to hot-air stove warming as a misfortune; and I am satisfied that only experience of the value of it is required to bring it into general use. Considerable personal acquaintance with the subject has satisfied me that the most perfect method of warming a dwelling-house is by means of air, heated by a properly contrived stove. I believe that this method is the simplest, the most economical, the most healthy, and the most effectual. I may truly say that, until I adopted this plan of warming, I never knew what it was in winter in this country to live in a house which possessed a comfortable atmosphere. I made use above of the words 'a properly contrived stove', and I will therefore, before speaking of its special advantages, give an outline of the machine I employ. In the basement of my house is placed an iron stove (of course, especially constructed to do its special business), which is encased in a dome of brick-work. Into the bottom of this dome air from the outside of the house is admitted. This passes under and plays around the winged stove, and, rising as it is heated, distributes itself through pipes and channels in the walls into passages and rooms. Once the stove is lit, there is nothing more to be done than to feed it. Its heat-producing, that is, coke-consuming, powers may be regulated to a nicety. It demands very little attention, and does its work night and day. Mine has been constantly alight, night and day, for the last nine weeks. Properly fed the last thing at night, with the draught reduced to prevent too rapid consumption of fuel, it is always alight and ready for its morning supply.

This way of warming a house is, according to my experience, perfect; there is no screw loose in the process that I can discover. The simplicity of the thing is manifest; rooms and passages are warmed from one single heating centre; no mechanical force is required; its ascensional power conveys the heated air upwards; it can be passed into any room or passage at pleasure, regulating the supply, or cutting it off altogether, simply by opening more or less, or by closing entirely, the ventilator through which it passes into the room or passage. In this way, by opening the ventilator, an unused room may be, in a few hours, thoroughly and equally warmed. I need hardly say that one blessed and saving incident is here an immediate necessary result; the most unpleasant of housemaids' operations are here—so far—at an end; the labour and dirtiness of lighting and coaling half-a-dozen fires are spared; no blacking and cleaning of grates are required; there are no carrying of coals upstairs; and no flying about of ash-dust.

The economy of this mode of house-warming is equally undeniable. In open fire-places, I may safely say that from 25 to 40 per cent. of every twenty shillings' worth of fuel and fuel-heat goes up the chimney. All the heat got out of this fuel is the radiated article; a large share of it is convected up the chimney. Of course, also, unconsumed coal fuel represents soot; and becomes the householder's contribution to the general smutty cloud suspended over us. In my stove coke alone is burnt, so that, in this wise, there is no smut-delivery at all events.

Now, I believe that out of every pound's worth of coke I get so much of my pound's worth of heat that even a Shylock would not grumble at the bargain. Almost every particle is consumed in my service, and on my premises. Heat and demon soot do not go in volumes up the chimney. Hence it follows in this stove-working that the householder, whilst benefiting himself, is doing a good turn to society in general. He is an active and actual promoter of the objects of Anti-Smoke Societies. He does more than declaim against smoke; he stifles the evil product in its birth. Now, one indication of a scheme being good is, that it works well all round, is not only good in itself, but produces secondary good, and under this head the stove certainly scores other *cretâ notanda* marks. As there is a constant supply of fresh warm air from without into the house, there is a cessation of those whistling struggles and cold cutting streams of air which pass through every available key-hole and rift to replace the air which is carried up the chimneys of our open fire-grates; one is not roasted on one side, and at the same time frozen on the other; there is no temptation to the use of excited language if the door be left for a moment open; the temperature is equable throughout the house.

As to the particular evils laid to the charge of hot-air stoves, I may say of them, in bulk, that according to my experience they are simply the offspring of imagination—judgments before knowledge. In saying this it must of course be understood that all the scientific requirements of a proper stove are fulfilled. The air to be heated must come from outside the house, and must be as pure as the outside can deliver, and not drawn from the neighbourhood of dustbins or drains. Then, again, the construction of the stove must be perfect. It must be so contrived that no villainous vapours of coke-combustion can escape from it and mingle with the air distributed to the house. A bad machine readily provokes condemnation of a good contrivance.

One serious charge laid to the charge of heated air is that it is dry. This has always seemed to me a curious indictment coming from the British Islander. The one thing before others which he demands is, that his house shall not be situated in a damp district, and that his surrounding atmosphere shall not be of the moist sort. When he goes abroad for health or recreation, his first desire is a dry atmosphere—Swiss Mountain resorts, Engadine Valleys, or the Basses Pyrénées. If there is, indeed, one enemy, in a small domestic way, against which our tender natured ones especially exclaim, it is against their demon, damp. Sleeping in a room with damp on the walls is to such-minded people like sleeping in their winding-sheets. How this general abuse of damp air and particular abuse of stove dry air are to be reconciled I know not, unless we call in prejudice

and inexperience. At all events, I may safely affirm that the proof of this dry air evil has yet to be given. Certainly, in the details we read of the progress of patients who pass their winters in the Engadine, and, of course, chiefly in Swiss stove heated rooms, we hear no complaints in this direction. And here a little consideration of physical facts shows that not one particle of the moisture, *i.e.*, of the watery vapour contained in the air outside, is really removed by the heating process. It is all there when it comes into the house, only, in consequence of the expansion of the air, the vapour is, for the time, distributed through a larger volume of it. But, even if the dryness of the heated air were proved to be objectionable, and not merely an imaginary evil, the evil or the disturbed imagination may be at once allayed by the simplest of contrivances; the mingling of watery vapour with the heated air.

Another charge which has been brought against iron stoves is that when accidentally heated to redness they emit an unpleasant odour. Now, for a month or two after my stove was erected, it certainly did sin in this way, but after that time the unpleasant smell vanished; and certainly, however red hot it may accidentally be, it now never gives us any such indication of the fact. I am not clear as to the cause of this initial fault, and as it is only of quite a temporary existence, I do not think it worth while speculating on the possible causes.

Further consideration suggests that the hot-air stove system may become a partial solution of the smoke nuisance, one of the evils of the day, at this moment an especial cry. Perhaps I might, therefore, add a word as to the use of coke generally. Speaking from my own experience I would advise every gentleman or lady who declaims at public or private meetings against the villanies committed by a soot-loaded atmosphere, to use coke in his or her house. They will thereby assuredly, in addition to the pleasure of decrying the thing rhetorically, have the satisfaction of practically contributing to its diminution; and I believe, also, of effecting a saving in their fuel expenditure. In an open fire-place coke cannot, of course, be burnt by itself, but mixed with coal it produces a bright smokeless heat; and, besides this, helps the consumption of the smoke emitted by the coals with which it is mingled. The kitchen-range is naturally the chief smut-creator in a house, and consequently the use of coke in it is especially desirable. If coke-burning stoves were largely used for the general warming of houses, and if coke were also largely mingled with coal in open fire-grates, it would follow of necessity that our hovering sooty atmosphere would, *pro ratâ*, lose its smut-distributing quality. But then, it might be said, if every one takes to burning coke, where is the supply to come from? I think a good and ready reply may be given to the question. Gas Companies are yearly selling their wares cheaper and cheaper, and yearly also does the use of gas, as a means of cooking, increase; but this use, it may be certainly said, is still in its infancy. The advantages of cooking by gas are, nevertheless, so manifest, and so great, that the prejudices and difficulties which oppose it must assuredly succumb, especially if the economical side of the question be demonstrated. The cook, instead of laboriously preparing a large fire to roast a leg of mutton, by the turn of a tap of the gas-stove, has, off-hand, all that is required. There is no occasion to light a fire in order to boil a kettle; nor to burn half a scuttle of coals for the grilling of a mutton chop. No doubt there are some good reasons to be given why we do not at once adopt the apparent blessings of a gas-stove. We may have fitted up costly ranges of the usual stamp; we may not be able to depend upon a constant and efficient supply of gas; we are not sufficiently enlightened as to the expense of the gas use; and we may have prejudices as to the sort of cooking under its use. But these difficulties will undoubtedly find a satisfactory solution. Now it must needs follow that, as the consumption of gas increases, so will increase the supply of coke. If, therefore, the stove system of house-warming be increased, there is no fear that the supply of coke will fail; and, as already said, just in proportion as we multiply our use of coke and gas, do we diminish our smutty atmosphere.

We have a nuisance under ground, and a nuisance over head. The first we have got rid of at an enormous expenditure, but in a wasteful and otherwise far from satisfactory manner. In lessening our overhead nuisance in the way proposed, we do and gain nothing but unmitigated good all round. We save our fuel, we put down smuts, we warm our houses effectively, we diminish domestic labour and household dirt, by putting down our ordinary open fireplaces.

THE ETIOLOGY OF DIPHTHERIA, &c., &c.

By G. H. FOSBROKE, S.Sc.C. Camb.,
President of the Birmingham and Midland Association of Medical Officers of Health.

(*Concluded from p.* 299.)

THE predisposing causes of diphtheria are numerous. 'Individual susceptibility' is increased by any reason which has a depressing effect upon the system, and this is particularly the case with pharyngeal catarrh. Age, as we all know, is a powerful predisponent. Children, between 3 and 12 years, are more liable to contract it than other persons. Diphtheria certainly may occur at almost any age, but children are the principal victims. The highest percentage of attacks among my own cases has been in children between the ages of 5 and 10 years, but this is in some measure accounted for by the prominence of school influence. Infants 'under 1 year' are less susceptible than other children; indeed it was once supposed that they always escaped. Until last year I had not met with a case among children at the breast, but in April such an one came to my cognizance. The infant, who was only 5 weeks old, was seen by two other medical men, and pronounced to be suffering from a well marked type of disease. According to my experience, the younger the children the greater the fatality. From a tabular statement I made of the cases which constituted four defined outbreaks, I find that 33.3 per cent. of the attacks among children between 1 and 5 died, and 25.4 per cent. of those between 5 and 10 years. It may be thought that these mortalities are high; when, however, I tell you they include a rural outburst, where only nineteen children sickened, but when twelve of them succumbed, you will not be surprised that the mortalities I have quoted are above the average.

After 'age', 'family susceptibility' has an important influence on the incidence of diphtheria. The activity and virulency of diphtheritic contagiousness seems to be varied in a curious manner by this predisposing cause. It is remarkable how the disease spreads in the most deadly manner in one household, and yet does not extend to persons who, not

being of kindred constitution, are in constant attendance on the sick. If it had been desirable, I could have quoted very many instances of the ravages it commits in some families, while in others solitary cases alone occur; but I will content myself with making a single reference. Diphtheria appeared in one household, consisting of a man, his wife, and five young children, in the course of the first week in October (1878); and by the 22nd of the same month the only survivors of this family were the father and mother, who were left to mourn the terrible loss they had sustained. The important element which favoured this development of the disease, was undoubtedly constitutional susceptibility, for the sanitary condition of the cottage was exceptionally good. I do not think that 'sex' can be assumed to act in any way as a predisposing cause. Again, 'social status', so far as I am in a position to judge, cannot be considered as a predisponent. My experience in consequence of my connection with a rural district, has been largely derived from the prevalence of diphtheria among labourers of the agricultural class. At the same time, I think, when fairly epidemic, all classes of the particular community invaded contribute their share of the cases. It seems to me that the protective power of an attack of diphtheria, against recurrence of the same disease, although considerable, is not so great as is the case with scarlatina or typhoid fever. Mr. Blyth, in his paper on the 'Prevention of Propagation of Diphtheria', read before the London Society of Medical Officers of Health, is evidently sceptical as to its recurrence at all, for he there stated that the question whether the disease can attack the same person twice, cannot at present be answered satisfactorily. 'But should', the author observers, 'it be caused by vegetable growth, one would suppose that the same person might be attacked an indefinite number of times'. Instances are on record where diphtheria has occurred three, or even more times, in the same individual; but I have never known it to recur more than once in the same person. In few cases have I met with patients who have suffered twice; but that it does occasionally recur, I think there is not the least possible doubt. One case bearing on this point made an impression on my mind; a lad, aged 18, suffered with a mild but characteristic type in October, and in the following December, quickly succumbed to a recurrence of the disease. During the interval between October and December, diphtheria was prevalent in the village where the lad lived.

On account of the subtle nature of the diph- noison and the uncertain time convales- us, it is not always an easy with any degree of certainty period may be. Sometimes it hort, not more than sixteen or ordinarily speaking I think it a two to five days. Instances he incubation period has been ore than, fifteen days. nature of diphtheria is more , the period that must elapse nfection and manifestation of must be left as an undecided question. When presenting my sixth annual report, I drew up a series of conclusions on the nature of diphtheria, one of which was couched in the following terms: 'diphtheria can arise' *de novo*, 'and all insanitary conditions, particularly polluted water, are intimately associated with its origin and distribution'. The question whether a case of an acute specific disease can arise independently of an antecedent one, is debatable; and although so repeatedly discussed, is still *sub judice*. I think, therefore, if I attempted to advance any general arguments in favour of the opinion I have formed, viz., that such a query might be answered affirmatively, I should prolong my remarks to an unjustifiable extent. Some years ago I admit I was not prepared to accept the theory that an infectious disease could have a spontaneous origin. A large experience, however, acquired, I would remind you, in a rural district, where the ordinary sources of error encountered in urban communities did not exist, have made me a convert to that view. Although, as I have said, I am a supporter of the '*de novo*' origin of disease, I consider it to be highly undesirable, in holding any investigations into the causation of fevers and those allied disorders, to lose sight of the 'germ or parasitic theory'. Personally, when holding such enquiries, I am continually on the look out for new channels by which specific poisons may be conveyed; but the fact that many such have been lately discovered, does not, to my mind, materially strengthen the argument that the diseases are exclusively self propagating. That diphtheria when once fairly introduced into a susceptible community is so, no one can deny, but the essence of such self-propagation has yet to be discovered.

Dr. Burdon Sanderson has shown that 'if the exudation of a simple peritonitis be injected fresh into the peritoneum of another animal, the disease assumes a more intense form in the second than in the first; and that by a further transmission of the exudation, a still more intense inflammation will result, until at last a virus is obtained, of which the virulence resembles that of the specific cases of malignant peritonitis of the human subject'. Now it appears to me that the origin of many outbreaks of diphtheria can be explained, by adopting the view, that a specific poison can generate by progressive development. I have more than once observed that the earliest cases of what has ultimately become a serious epidemic have manifested simple sore-throat alone. I will quote one painful instance. A very severe outbreak of diphtheria, which ultimately resulted in twelve deaths, suddenly appeared among the pupils of a parochial school. All attempts to connect this outbreak with insanitary conditions having failed, I discovered that a child who had undoubtedly had diphtheria, had returned to school about three days before the earliest cases appeared. This child having clearly brought the disease among her school-fellows, I proceeded to trace the history of this case further, and I found that the house in which she dwelt was situated in an isolated position in an agricultural district. When going into the antecedent history of this case I found that three members of the same family had been treated for mild sore throat, which had no diphtheritic appearance. The movements of this family could be clearly traced, and after a laborious enquiry I come to the decided opinion that the first case was one of simple sore throat, not traceable to any local insanitary defect, but that by development through progressive stages in three children, the disease ultimately became diphtheria of a most decided type, since the fourth child who went to school disseminated it right and left. Now if this view, first I believe expressed by Dr. Thorne Thorne, should be correct, as I am disposed to believe (and as proof of which I could quote other instances), not only

should practitioners be careful in giving an opinion upon 'sore throat', but also it seems to me that several points connected with this obscure disease could be easily explained. For instance, the lapse of time that some observers have found to exist between previous outbreaks of fatal sore throat and recent ones (I mean where the interval has amounted to such lengthened periods as fifteen or twenty years) would be explained. My own experience of diphtheria does not warrant the assertion that the localities it has more recently selected, were at earlier dates prone to the same disease.

In one district, lately liable to diphtheria, I have learnt from an able practitioner that, during the course of his professional career, which has extended over nearly half a century, that until recently the disease was unknown in the locality in question. As mild 'sore throat' may be antecedent to diphtheria, so, too, it may be consequent upon even its most aggravated forms. This would seem to show that such cases are greatly dependant upon family susceptibility. Although, in my opinion, the commencement of some attacks of diphtheria can be traced to this 'progressive development' of 'sore throat', still the origin of some cases is most perplexing and impenetrable. Some Russian observers have propounded the view that occasionally there is some relation between the origin of diphtheria and decomposing blood, but I am not aware that any such connection has been noticed in England. Again, Dr. Alfred Carpenter, in a letter addressed to the *Brit. Med. Journ.* in Jan. 1879, has suggested that the conditions which favour potato blight, have an influence upon diphtheria. Since the publication of this letter, I have made some few enquiries on this point, but I can detect no such associations—but rather the contrary,—for whereas potato blight has been prevalent in many parts of my district during the past eighteen months, diphtheria has been more than usually conspicuous by its absence.

The next question which comes to my mind with regard to the causation of this disease, is its relation to insanitary surroundings. Now, as I have previously stated, without jumping to any conclusion too hastily, I believe there is substantial evidence for thinking that the same poison which originates typhoid fever often causes diphtheria. In short, I look upon it as liable to be caused by the same insanitary conditions which can develop typhoid fever; it has, however, this destinctive character, that whereas typhoid fever but rarely becomes epidemic without certain local sanitary defects, such as polluted water, bad drainage, defective excrement disposal, etc., diphtheria may rage in districts free from such insanitary objections. I have strong evidence for concluding that it has a water origin, for I have traced at least three epidemics to the use of polluted water, and in corroboration of the correctness of my conclusion, I may assert that with the substitution of a wholesome supply, it disappeared from the districts in question. Isolated outbreaks in country districts are not uncommonly traced to cesspool emanations. The unventilated W. C. connected with a 'dumb well', and the form of closet which has a tightly covered vault attached, I regard as fruitful sources of evil. I could have laid before you cases which would substantiate the view I take of diphtheria, and its relation to insanitary conditions, but I feel that I must have already tired your patience in venturing to discuss some points with which you are doubtless so familiar. Varieties of opinions exist upon the manner in which diphtheria is disseminated, so some of my experience of this subject, although possibly not enunciating any new theory, may possibly be of some interest. Diphtheria is often sporadic, but frequently occurs as an epidemic. It was at one time held that it was diffused by contagion alone; and that unless the sputa or breath of an infectious person was inhaled the disease could not be contracted. But little credence, too, was placed in the belief that its occurrence was promoted by 'insanitary conditions'. These views are, however, now known to be fallacious. That it is highly infectious there is no doubt, but what the nature of the infection may be does not come within the scope of these remarks. The activity of the infection is, however, much modified by individual susceptibility, for it is not a rare occurrence to meet with but one case in a large family, whereas in the adjoining house all inmates may possibly be suffering from its effects. The infection must, to some extent, be diffusible in the air, for the presence of one patient in a dwelling of moderate dimensions, is sufficient to communicate the disease to any other inmate who may be susceptible. I trust that I shall not be misunderstood when I say 'diffusible in the air', for as I shall presently tell you, I cannot think that the infection can be wafted from house to house, and village to village by atmospheric agents.

I have frequently found that the earliest dimensions of an outbreak have been brought about by some mild cases being unrecognised, and so unguarded against; but I quite think that when the disease assumes an epidemic form, it does so because the infection is conveyed by the ordinary channels. It may be transmitted from person to person by those actually suffering, or from convalescents. In country districts, schools too frequently play a most important part in disseminating it. The congregation of children in such institutions, where too often the rooms are ill ventilated, brings them of course into close contiguity one with the other, so that should one of them be in an infectious state, it can easily be understood with what ease the disease can be transmitted. In my district, school influence has been a most important element of distribution. The question is frequently asked of a medical man, when diphtheria has appeared in a family, how soon may my child return to school? Now this is a difficult question to answer satisfactorily, for it is not at all clear to me at what period of convalescence the active contagiousness ceases. That infection emanates, for a prolonged but uncertain time, from those who are convalescent, there can be no doubt. Therefore the answer I ordinarily give is in the first instance of course based upon the appearance of the throat, inasmuch as I should not feel justified in pronouncing a child non-infect
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missibility of the disease. That it is easily communicable from person to person is certain, but I go farther, and contend that it may be carried from house to house by individuals not at any time suffering themselves, but who have been exposed to infection. In support of this assertion I will mention but two cases; the first (amongst other similar ones) came under my own notice; the second was observed by Dr. Hubert Airy and communicated to me by

that gentleman. One morning I received notice that diphtheria had appeared at a village about two miles and a half distant, and separated by the river Avon from a second village, in which the disease was prevalent.

On investigating the report, I found that a labourer's wife, with two children, had been on a visit of ten days' duration to the latter place. Five days after, the family (which consisted of the man, his wife and three children) returned; the third child, who had not left home for many weeks, developed characteristic signs of diphtheria, while those who had been on the visit remained in good health. Careful enquiry negatived the assumption that this 'third child' came in contact with the diphtheritic poison, except through the agency of those who had been on a visit. Now, in the village where this case appeared, diphtheria had never been known, or more properly I should say, not heard of, for at least twenty years. No sort of inter-communication, save the one I have spoken of, existed between these two places. What, however, induces me to select this among other instances, in support of the portability of diphtheria, is because I was able to see this child, and enquire into the whole history the day after he sickened. I may add that I examined the throats of the mother and two children who had been on the visit, and neither from their appearance, nor the accounts these persons gave of themselves, could I imagine for an instant that they had had even mild 'sore throat'. Before arriving at this conclusion, I made a searching enquiry into the merits of the case. The second instance to which I wish to call your attention is the following: 'a girl in service at a house where the mistress had diphtheria, went home for a day or two to her mother's cottage in a lonely spot among the Welsh hills, six or seven miles distant from the village where diphtheria prevailed. The girl had no symptom of throat ailment at all. About ten days afterwards a younger sister at home was taken ill, then another, and then the neighbours. No connection with the infected village could be traced, except in the person of the girl, who had certainly been in close relation with diphtheria, but had not caught it herself. Now these cases are to me as complete proof, as it is possible to obtain, that diphtheria is portable in the persons of those who have not had the disease. Diphtheria in its dissemination, as well as in its origin, is I think allied to typhoid fever on the one hand and scarlatina on the other, for like the former it can be sown broadcast by the agency of polluted water and sewer gas, and like the latter is highly infectious, and in some cases easily transferred. The sputa and exhalations from the breath are the most important disseminating media; but I think it would be unwise not to regard [illegible] what similar light.

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Having now called the attention of my readers to some points bearing upon the causation and distribution of diphtheria, I will conclude my remarks by enumerating the precautionary measures necessitated when dealing with it. An all important point is to isolate each and every case immediately it crops up. Now, as the disease so often appears in dwellings where this precaution cannot be carried out, the only alternative is to remove the patients to a suitable hospital.

From practical experience, I know full well that when such an institution is well regulated, and the charge for admission thereto but nominal, that parents will readily send in their children. It is my custom to advocate the removal of children of all ages, and when isolation of infants is called for, to give permission to their mothers to accompany them. With a baby, the mother is of course compelled to remain in hospital as long as the child does; but, with children three years of age and upwards, I invariably find that the parent usually remains in charge for a few days, and then finding her child comfortable and happy, returns to her own home, and subsequently pays periodical visits to the hospital. When an infected dwelling is cleared of its patient, as thorough disinfection is called for, as if the house had been occupied by a person suffering from scarlatina or small-pox. The disinfection of the infected rooms, articles of bedding, furniture, etc., cannot be too scrupulously looked after, for it is remarkable with what tenacity the infection clings to such things—at least such is my experience, for I have known the disease recur in the same house weeks after, when this precaution was neglected. Speedy interment of the dead should be carried out, and the corpse should be treated as a fruitful source of infection. A singular instance of the vitality of the diphtheritic poison was reported in the *Brit. Med. Journ.* of June 1879, and was as follows: A gentleman, in the South of Russia, had four years previously lost a boy from diphtheria. A family vault having recently been constructed the coffin was transferred thither. Before it was lowered down into the vault, the father wished to look at the body. An opening was accordingly made in the lid of the coffin, the whole family, including five children, looking on. The next day all the children were ill with diphtheria and one died.

The closing of schools should be unhesitatingly adopted when one or two cases have appeared amongst the pupils. The postponement of such action very often converts a simple outbreak into a severe epidemic. Disinfectants should be freely used, and all refuse matters coming from infected persons should be carefully buried. The general sanitary condition of the district should be carefully looked into; and, if necessary, improved.

With such rigid but judiciously applied precautionary measures, I quite think that the ravages of diphtheria are as controllable as those occasioned by any of the other dangerous zymotic disorders.

Such are a few of the conclusions on the etiology of diphtheria I have arrived at, after having had somewhat extensive opportunities of witnessing this disease.

SANITATION IN MASSACHUSETTS.*

By FRANCIS VACHER,
Medical Officer of Health, Birkenhead.

DURING a brief holiday in America, I had specially favourable opportunities of studying the Public Health regulations in Massachusetts and the arrangements for giving effect to them, and am therefore able to give some account of the Massachusetts State Board of Health, its powers and duties.

The Act which established the first Massachusetts State Board of Health was passed in June 1869, and the following month the seven members necessary to constitute it were duly commissioned. The first meeting was held on September 15th, and on September 22nd the organisation was completed by the choice of Dr. Bowditch as chairman.

On July 1st, 1879, a State Board of Health, Lunacy, and Charity, was organised to take the place of the State Board of Health and the State Board of Charities, etc. In order to perform its varied duties with efficiency, it was deemed best to divide the work of the Board into departments, corresponding to the subjects committed to its jurisdiction. The secretary to the Board performs the executive duties of the Health Department.

In the Organic Act constituting the Board, it is set forth that the governor, with the advice and consent of the council, shall appoint nine persons, to hold their offices for five years, provided that the office of the nine first appointed shall be so arranged that the term of one shall expire in five years, the terms of two in four years, three years, two years, and one year respectively; and that all vacancies shall be filled by appointment or re-appointment by the governor and council. The Board shall have all the powers and duties of the boards abolished by the Organic Act, with certain exceptions; and may assign its powers and duties to agents, and may execute any of its functions by agents or by committees it may appoint. The Board has supervision of charitable and reformatory institutions, and acts as a commission of lunacy. In case of 'contagious or infectious disease dangerous to public health', existing or being 'likely to exist in any place within the state, said Board shall investigate the same, and the means of preventing the spread thereof, and shall consult thereon with the local authorities, and shall have co-ordinate powers as a Board of Health, in every place, with the Board of Health or Health Officer thereof, and with the mayor and aldermen or selectmen, when no such Board or officer exists in such place.' The Board, with the consent of the governor, shall appoint necessary officers, shall hold meetings monthly and at such other times as may be needful, shall make its own bye-laws, and shall report of its doings yearly to the governor and council. The members of the Board receive no payment for their services, but their travelling and other necessary expenses are allowed.

The Act of 1869, establishing the first State Board of Health (the provisions of which are still in force), has two important sections—one directing the Board to appoint a secretary, either from their own number or otherwise, at an annual salary of 2,500 dollars; and the other instructing the Board 'to examine into and report what in their best judgment is the effect of the use of intoxicating liquor, as a beverage, upon the industry, prosperity, happiness, health, and lives of the citizens of the state; also, what additional legislation, if any, is necessary in the premises.'

By an Act framed in 1871, the Legislature forbade the erection of slaughter-houses or establishments for rendering or carrying on other noxious or offensive trades in any town *containing more than 4,000 inhabitants*, without permission; and in 1874 the words in italics were struck out. By the same Act the State Board of Health may order persons carrying on offensive trades to desist under a penalty.

An Act passed in 1875 directs the State Board of Health to investigate the subjects of drainage and sewerage of the cities and towns of the Commonwealth, especially with regard to the pollution of rivers, estuaries, and ponds by drainage, etc., and to devise and report a system by which said cities or towns may be properly drained, and rivers, estuaries, and ponds protected from pollution so far as possible, and to report how far said sewage may be utilised or disposed of.

An Act passed in 1877 authorises the same Board to inquire what legislation is necessary to prevent the pollution of streams, etc., used as sources of water-supply by cities and towns in the Commonwealth.

In the following year an Act was passed prohibiting the pollution of the sources of water-supply by sewage, but the prohibition is almost nugatory, as it is not to be construed as destroying or impairing existing rights, and is not applicable to the Merrimac or Connecticut rivers, nor to the whole of the Concord river. By the same Act the sources of water-supply (with the important exception of the three rivers just named) are placed under the supervision of the Board of Health.

The only other Act bearing upon public health matters, passed by the Massachusetts legislature in 1878, prohibits the discharge of sewage from the Concord State Prison into the Concord river, unless the sewage be first purified in a manner satisfactory to the Board.

The year 1879 was specially fruitful as regards sanitary legislation in Massachusetts. Previous to the passing of the Organic Act already referred to, three acts of more or less importance were approved. One permits the city of Boston to discharge its sewage into the Roxbury canal, at a point east of that at which it now discharges, and permits the diversion to continue until the system of sewerage now being constructed shall be in practical operation. A second act provides for the disposal by irrigation of the sewage of the reformatory prison at Sherborn, hitherto discharged into Lake Cochituate. The third Act referred to requires all water boards and water companies making use as a source of water-supply of any lake, river, brook, etc., with
to make triennial returns t
publication in the Board's
The form of return is spe
very complete, requiring s
nine questions.

This is a summary of the
chusetts having special refere
of Health. Perhaps I shoul
list a short Act passed in 18
power to retain charge of a cas
in its care, to the exclusion of o
and providing for the reimburs
incurred by the Board in respect of such case.

The following sections of the twenty-sixth chapter of the General Statutes, also refer to the State Board of Health:—

* Read at the meeting of the North-Western Association of Medical Officers of Health, held at Manchester, on February 9th, 1881.

'*Section* 40.—Any town may establish within its limits, and be constantly provided with, one or more hospitals for the reception of persons having a disease dangerous to the public health.

'*Section* 41.—Such hospitals shall be subject to the orders and regulations of the Board, or of a committee of the town appointed for that purpose.

'*Section* 44.—When a disease dangerous to the public health breaks out in any town, the Board shall immediately provide such hospital or place of reception for the sick and infected as is judged best for their accommodation and the safety of the inhabitants, which shall be subject to the regulations of the Board; and the Board may cause any sick and infected person to be removed thereto, unless the condition of such person will not admit of his removal without danger to his health, in which case the house or place where he remains shall be considered as a hospital, and all persons residing in, or any way concerned within the same, shall be subject to the regulations of the Board as before provided.

'*Section* 45.—When such disease is found to exist in a town, the selectmen and Board of Health shall use all possible care to prevent the spreading of the infection, and to give public notice of infected places to travellers, by displaying red flags at proper distances, and by all other means which in their judgment shall be most effectual for the common safety.

'*Section* 51.—The provisions of Sections 16, 17, 44, 45, and 46 shall not apply to small-pox.'

By a statute passed in 1872 the provisions of Sections 44 and 45, so far as they confer authority for the removal of patients from their homes, are modified in respect of the limitations to them contained in Section 51. Patients suffering from this disease may be removed by the Board, but only such as reside in boarding-houses, hotels, etc., or cannot be properly isolated.

Under statutes passed in 1873, the offences of obstructing means to prevent spreading of infection, and violating hospital regulations, are made punishable by penalties. Householders also are required to give notice of all cases of dangerous infectious disease in their families; and physicians are required to give notice of all cases of such disease which they may be called to visit. In either case refusal to give such notice is punishable by the infliction of a penalty not exceeding one hundred dollars.

Finally, I must not fail to note that in an Act relating to the restraining and muzzling of dogs, passed in 1877, it is ordered that every dog licence shall have printed thereon a description of the disease in dogs known as hydrophobia, said description to be supplied by the secretary of the State Board of Health'.

This completes my summary of the powers and duties of the Massachusetts State Board of Health, [illegible]rs and duties of the health depart[illegible]l of Health, Lunacy, and Charity [illegible]it. Whether incorporating into [illegible]oards having presumably distinct [illegible]ice to be commended is, of course, [illegible]nd must remain so; a few years' [illegible]wever, determine the wisdom or particular act of centralisation. [illegible] distinguished chairman of the [illegible]nd till the close of 1879 the chair[illegible]man [illegible]ittee on Health of the existing Board, expressed himself to me as opposed to the change, remarking that public health was quite enough for one board to look after. This is so true, and impresses us all so much, that we are apt to overlook the possible advantages of merging two or three boards into one—*e.g.*, the stopping of petty disputes as to money charges, and liability, and whose duty it is to provide accommodation for infectious patients when they are almost paupers but not quite. Certainly in Massachusetts health affairs receive no less attention now that they are controlled by a departmental committee instead of a board. The supplement to the first annual report of the joint board, containing the report and papers on public health, witnesses to the work done and the inquiries undertaken during 1879. I have pleasure in noticing this volume, which is a most carefully compiled and instructive blue-book. The report is a carefully written, well-condensed summary, and the articles which follow give particulars of special investigations and local inspections, all of which are interesting and instructive, and some very able. A mere list of the inquiries undertaken will give some idea of the work done. There are three on the pollution of streams, two on foods, six on various matters relating to water-supply, four on the etiology of certain localised outbreaks of typhoid fever, there is one on the drainage of summer hotels and country boarding-houses, and one on sewerage by the engineer in charge of the improved sewerage works now being carried out in Boston. As good examples of thorough researches, and as marking the liberality of the board in issuing the records in good form, the papers on drainage of summer hotels, etc., illustrated with thirty-three plans and diagrams, and the suggestions on sewerage, illustrated with thirty-nine plans and diagrams, are especially worthy of note. The paper on trichinæ also deserves special attention, and is very fully illustrated.

The arrangements for carrying out the work of the health department are of the simplest description. There is a central office in Boston, and the staff consists of a secretary, medical officer, and clerk. Distributed throughout the state there is a large number of local correspondents, and these keep the department informed on all matters relating to public health, send in mortality and other returns, receive advice from the department, or act on its behalf. When special work is required, as the conducting of an investigation, or the compiling of a report from evidence collected by forms, the services of an expert or literary man are obtained. That the precise nature of the work, routine or special, performed by the Board may be better understood, I here submit a set of the forms and orders in current use. They are as follows:—

1. A weekly mortality return for thirty five of the most populous cities in the United States, specifying the total deaths, deaths under five years, and from principal zymotics, and the death-rates in each case.
2. A detailed return of deaths from thirteen principal zymotic diseases and from phthisis and lung diseases, for the same thirty-five cities.
3. Post-card for rendering such return.
4. Circular to Local Boards of Health on the care of young children, including notes on food, weaning, bathing, and clothing.
5. Circular on house drainage.
6. Circular on soil-pipes and drains.
7. Circular on disinfection.
8. Circular—'Suggestions for preventing the spread of scarlet fever.'
9. Circular—'Suggestions for preventing the spread of diphtheria.' (Copies of either of these circulars may be had for distribution on application to the secretary of the Board.)
10. Form of quarterly return to State Board of prevalent diseases in city or town, and circular applying for return.

11. Circular asking for notification of cases of infectious disease, and giving advice as to the disinfection of infected vessels and dwellings, etc., infected persons, and such as have been exposed to infection.

12. Circular to Local Authorities in view of the appearance of small-pox in the state.

13. General circular asking for assistance from Local Boards of Health and proffering advice and counsel.

14. Circular urging Urban Authorities to give effect to the Act authorising the appointment of Boards of Health.

15. Circular asking for notes of facts to serve as data for an investigation of the laws governing the inheritance of pathological conditions, etc.

16. Circular asking a correspondent to supply information as to the local prevalence of diphtheria.

17. Circular asking for information as to the sanitary condition of school-houses.

18. Circular to manufacturers with reference to the pollution of streams.

19. Two circulars of questions to correspondents with reference to the pollution of streams.

20. Circular of questions to medical practitioners with reference to a special investigation on scarlet fever.

21. Circular of questions to superintendents of schools with reference to the same investigation.

22. Circular asking for copies of reports from public institutions.

23. Circular of questions to medical correspondents for information as to the health of towns.

24. Circular of questions to medical correspondents for information as to the health of Boston.

25. Circular of questions to medical correspondents with reference to the use of running streams as sewers, etc.

26. Reprint of the Organic Act in circular form.

27. Reprint of the Pollution of Rivers Act, 1878.

28. Blank for water-supply returns.

29. Circular note to accompany copy of Annual Report of Board.

Thus it will be seen that the duties and work of this State Board in many respects resemble those performed by our Local Government Board. The Massachusetts Board, like ours, exercises a general supervision over health affairs throughout the state, its power to interfere in urban districts, where there are properly constituted health boards, being, as is the case with our Board, very limited. The Massachusetts Board, like our Board, gives advice and counsel, undertakes investigations general and special, and issues an annual report and supplement. The powers of the Massachusetts Board appear to be somewhat greater than our Board. The main difference, however, is that in this country a permanent staff of inspectors is kept, whereas in Massachusetts a doctor, chemist, engineer, expert of any kind is commissioned as required for each specific work undertaken. It might be thought that this would prove a more costly practice than employing permanent inspectors, but this is not the case. On the contrary, the Massachusetts State Board is a singularly economical one. During the latter half of 1879 the expenses of the health department amounted to but 4435.95 dollars, and of this but 1650.30 dollars was paid for examinations and investigations. And these sums may fairly be taken as representing the ordinary half-yearly expenditure.

ERRATUM.—Page 307, in paragraph at foot of page, line 9, *for* 4.25, *read* 42.5.

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap. 2d. tablets.—(Advt.)

THE REGISTRAR-GENERAL'S QUARTERLY RETURN.

THE Registrar-General's quarterly return, lately issued, which relates to the last three months of 1880, possesses more than usual interest; it not only supplies the means for analysing the statistics for the year 1880, but it also completes the figures for the fourth decade of civil registration, 1871-80.

The mean temperature of the last three months of 1880 scarcely differed from the average for the corresponding period in 109 years; October was generally cold, and November of average temperature, while December was unseasonably mild. The measured rainfall was nearly double the average amount; and the recorded hours of bright sunshine were below the average. Such were the meteorological conditions of the quarter under notice.

Under the influence of the depressed marriage-rate in recent years the birth-rate in England and Wales last quarter did not exceed 32.3 per 1,000, which was 2.5 below the average rate in the ten preceding corresponding quarters. In twenty of the largest English towns, the birth-rate averaged 34.4 per 1,000, against 36.2 and 36.4 in the fourth quarters of 1878 and 1879. Among these twenty towns the rate ranged upwards to 36.5 and 37.7 in Liverpool and Wolverhampton. In fifty other large town districts the rate averaged 32.8, the lowest rates being 21.7 and 22.5 in Cheltenham and Bath, and the highest 41.6 and 43.1 in West Bromwich and Wigan.

The decline of births last quarter was, as we shall presently see, more than balanced by a marked decrease of recorded deaths. The natural increase of population by excess of births over deaths was, therefore, higher than in recent corresponding periods. Emigration, which had been steadily increasing since the beginning of 1877, declined last quarter. The proportion of pauperism also showed a decline from that which prevailed in the last three months of 1880.

The annual death-rate in England and Wales during last quarter did not exceed 19.6 per 1,000 of the estimated population, and was 2.1 below the average rate for the quarter. Only once, the Registrar-General tells us, since civil registration was established in 1837 has so low a death-rate been recorded in the last three months of the year; this occurred in 1845 when the annual death-rate in the December quarter did not exceed 19.1 per 1,000.

The mortality among males was at the rate of 20.7, and among females only 18.6 per 1,000 estimated to be living of each sex. In equal numbers living the deaths of males were as 111 to 100 deaths of females corresponding with the relative proportion [illegible] corresponding quarters.

In the several counties of England t[illegible] among persons last quarter ranged fr[illegible] 14.3 in Surrey and Dorsetshire, to 23. Nottinghamshire and Lancashire.

The urban and rural rates of morta[illegible] usual wide divergence. The rate in urban population was equal to 21.0, w[illegible] maining or rural population it did n[illegible] These rates were respectively 3.1 and [illegible] below the average rates in the ten p[illegible] sponding quarters. The death-rate i[illegible] urban was as 119 to 100 in the rural population; but the relative excess of urban mortality showed a marked decline compared with that prevailing in recent corresponding periods. In the twenty large towns the rate averaged 21.5, and ranged from 18.3 and 18.6 in

Sheffield and Portsmouth, to 24.7 in Sunderland, 25.7 in Salford, and 26.3 in Liverpool. In fifty other town districts the average rate was only 20.4, the lowest rates being 13.8 in Dover and 14.2 in Newport (Mon.), and the highest 25.4 in Preston, 25.8 in Wigan, and 30.5 in Ashton-under-Lyne.

Infant mortality, measured by the proportion of deaths under one year to births registered, was equal to 144 per 1,000, which was 2 below the average rate in the ten preceding corresponding quarters. Infant death-rates in counties ranged from 86 in Rutlandshire, 95 in Herefordshire, and 102 in Berkshire, to 177 and 180 respectively in Nottinghamshire and Leicestershire. In the twenty large towns infant mortality averaged 152 per 1,000; the lowest proportions were 132 and 138 in Portsmouth and Plymouth, and the highest 198 and 199 in Leicester and Salford. In fifty other towns the proportion ranged from 55 and 107 in Colchester and Chatham, to 210 in Northampton, 214 in Dudley, and 241 in Ashton-under-Lyne.

Among persons aged between 1 and 60 years, the rate of mortality was equal to 11.1 per 1,000 estimated to be living at these ages, which was 1.4 below the average. This rate was but 10.8 in Portsmouth, while it ranged upwards to 16.9 and 17.9 in Sunderland and Liverpool. Among persons aged upwards of 60 years, the death-rate was equal to 67.6 per 1,000 and was 5.8 below the average; in the twenty towns it averaged 74.1, and ranged from 55.4 and 65.0 in Norwich and Bradford, to 86.2 and 92.1 in Oldham and Wolverhampton. The death-rate last quarter was below the average at all ages, among infants, adults, and elderly persons.

Zymotic fatality was also considerably below the average. The annual rate of mortality from the principal diseases of this class, which was equal to 3.35 per 1,000 in the ten preceding corresponding quarters, did not exceed 2.74 last quarter. In the several English counties the rates from these diseases ranged from 1.02 in Rutlandshire, and 1.13 in Herefordshire, to 4.00 in Northamptonshire and 4.54 in Durham. In the twenty large towns the zymotic rate averaged 3.0, and ranged from 1.6 and 2.0 in Plymouth and Birmingham, to 5.8 and 6.8 in Salford and Sunderland. Scarlet fever was, as is usual during the last three months of the year, the most fatal zymotic disease last quarter. It showed especial fatality in Cumberland, South Wales, and Durham. Among the twenty towns the highest death-rates from this disease occurred in Oldham, Norwich, and Sunderland; and among the fifty other towns the disease caused an excessive death-rate in Colchester nd Swansea. The deaths referred to fever (prin- ally enteric), although they exceeded the number ned in the corresponding quarter of 1879, were erably below the corrected average for the ten g quarters. The highest county death-rates ric fever were recorded in Leicestershire st Riding of Yorkshire. The fever death- venty large towns was below the average vhole country, but showed a marked nouth, Leicester, and Salford. Among er towns, still higher death-rates oc- ston, Wigan, and Huddersfield. The measles was also generally below the hough it showed an excess in South tshire, and Northamptonshire; excessive local ity of this disease occurred in Salford, Exeter, Merthyr Tydfil, Trowbridge, Easington, Pontypridd, and Neath. Death-rates from whooping-cough and diphtheria were also below the average, although local outbreaks of the latter disease occurred at Surbiton, Bedford, Luton, Altrincham, and Dalton. Small-pox showed a further marked increase of fatality in London, where 160 of the 208 deaths from this disease during the quarter were registered; 26 of the 48 deaths from small-pox occurring out of London were recorded in Lancashire, including 15 in Bury, and 7 in Barton-upon-Irwell.

The causes of 5,337, or 4.2 per cent. of the deaths registered in England and Wales last quarter, were not certified either by a registered medical practitioner or by a coroner. The proportion of uncertified deaths was slightly higher than in the preceding quarter, and ranged from 1.3 in the metropolis, to 6.3 in Derbyshire, 8.0 in Cornwall, 8.5 in Durham and Westmorland, 10.1 in South Wales, and 11.1 in North Wales. Among the nineteen large provincial towns, the proportion ranged from 0.5 in Portsmouth, and 1.3 both in Plymouth and Nottingham, to 6.2 and 7.0 in Wolverhampton and Sunderland. The percentage of uncertified deaths showed a considerable increase last quarter in Sunderland, Sheffield, and Salford.

During the year 1880 the birth-rate in England and Wales was equal to 34.6 per 1,000, and showed a further decline from the steadily declining rates in the four preceding years, and was lower than the rate in any year since 1861, when the rate was equally low. The death-rate was equal to 20.7 per 1,000, and excepting the low rate in 1877, was lower than in any year since 1856, when it was 20.5. Last year completed the decade 1871-80, and we must defer an analysis and comparison of the statistics of the four decades 1841-80 for another occasion.

OPEN GRATINGS FOR SEWER VENTILATION.

By JOHN S. HODGSON, C.E.

IN the report of the discussion upon Dr. Wade's paper on 'The Sanitary Condition of Wakefield during the last Ten Years', contained in the February number of the SANITARY RECORD, I find, at page 305, the following remarkable statement attributed to Mr. North, President of the Yorkshire Association of Medical Officers of Health :—'As to open grates, the main consideration was what were their effects on the health of the people. Of course when they became so offensive that people cried out for their removal, they should be removed without delay.' Few persons will be found disposed to cavil at the sentiment expressed in the first sentence, containing, as it does, a sanitary truism applicable to many things besides open sewer ventilating grates. But, assuming Mr. North to be correctly reported in this extract, I trust he will pardon me for thus publicly dissenting from the conclusion at which he arrives in its concluding portion, seeing that I am by no means alone in maintaining that a diminution in the number of surface ventilating openings is utterly antagonistic to that health which he is so earnest in wishing to guard. In holding this opinion I am well aware of the fact that the introduction of the open ventilating system has been followed, in many towns, by an outcry on the part of the inhabitants; but in every case with which I am acquainted, this manifestation has been based upon a neglect of fundamental considerations, either in the original application of the system, or in its subsequent management, if not in both these respects. Open gratings have in some

instances been placed upon antiquated sewers whose original construction was faulty in the extreme, admitting of an excessive amount of deposit, such as is certainly not contemplated in laying down modern works of this class. Under such circumstances, it becomes impossible to maintain that degree of interior purity in sewers which I regard as being not only an indispensable concomitant to the open system of ventilation, but also as otherwise essential to the proper management and beneficial effect of sewerage works. The same remark applies also to sewers which, while they are satisfactory in themselves, and even provided with adequate flushing arrangements, are neglected by the Local Authority in which they are vested, the result, in this event, being sometimes as disastrous as anything arising from primary and inherent defects.

The absence of any well defined and systematically performed routine of flushing is the most obvious, as it is also the most common shape which this neglect assumes, but there are other points, tending to the same result, which Sanitary Authorities generally are only too apt to make light of. There are, for example, many towns which, having been sewered at a time when there seemed to be little, if any, prospect of practical legislation on rivers' pollution, adopted a combined system of rain-water and sewage removal, instead of being careful, as they now would, to limit the total volume of fouled liquid to a minimum by the greatest possible exclusion of surface water. In these cases the rain falling upon the wide areas of streets and roads is necessarily admitted to the sewers, carrying with it, unless judiciously restrained, a large amount of heavy and insoluble material which no well regulated sewerage system should receive. It may, of course, be objected that the gullies in the street channels are, or ought to be, so constructed as to intercept the objectionable matters referred to, and this is, indeed, generally the case, but, as a matter of fact, the value of this provision is too frequently nullified by the want of sufficient attention to gully cleansing, sludge-boxes and catch-pits being, more often than not, allowed to lapse into a chronic state of overflow. The same qualification holds good even with regard to yard-gullies, which are frequently of such a type as to render their effectual cleansing an unnecessarily difficult, if not, indeed, insuperably repulsive operation. Thus it comes that large numbers of sewers are the constant receptacles of substances which should be dealt with on the surface, instead of being allowed to interfere with the proper flow of liquids in underground channels, a circumstance which occasions one of the greatest difficulties arising in sewer management, and enormously increases the necessity for powerful and frequent flushing. It will, moreover, be apparent that sewers of a capacity equal to the reception of the rain falling in heavy thunderstorms (which must, of necessity, be the case in the combined system) require, even when well managed in other respects, an exceptional amount of flushing in dry weather, when the natural velocity and scouring power of the sewage are so much lessened by the excessive reduction in the depth of stream.

All these circumstances point to the imperative necessity for the regular and frequent flushing of public sewers to an extent varying inversely with the efficiency of their design and construction, and the care devoted to their maintenance in respect of the details above alluded to. In no case, however, can flushing be entirely dispensed with, unless with corresponding danger to the health of the locality affected, and this, too, altogether apart from the mere annoyance caused by offensive smells from the ventilating gratings. These gratings form, in fact, the best and most reliable index of the state of the sewers with which they communicate. The fact of smells arising from them must be taken as an infallible testimony to the existence of a wrong and dangerous state of things, and to the necessity for investigation in the first place, and for improved sewer management thereafter. To adopt any other conclusion, and to act upon it by closing the offending apertures, is to emulate the feat popularly ascribed to the ostrich, which, by thrusting its head into the sand, hopes not only to ignore but to elude the possibility of danger from its pursuers.

Closely connected with the nuisance often found to arise from the adoption of the open surface grating system is the state of the private drainage of the town, even where the design, construction, and management of the public sewers may be unexceptionable, if, indeed, a place conforming in all these particulars to the latter description can be found. Private drains are, as is well known, the weak point of most sewerage systems, owing to the much smaller degree of importance which is, unfortunately, almost universally attached to this category of work by Sanitary Authorities and others. As a consequence of this, many house-drains so far fail to comply with the canon of 'constant movement' laid down for all sewage, that filth lodges and decomposes within them until such time as it is propelled into the sewer, in a putrid and horribly offensive condition, by such adventitious means as a heavy rain or the recurrence of 'washing day'. To expect that sewers receiving sewage of this character shall not smell offensively is as hopeless as it is to look for sweetness in a dung-heap. But although the smell which escapes from sewer gratings under such conditions is, with all its unpleasantness, less inimical to health than the presence of such foul matter in confined drains, I am far from urging this as a palliative for the retention of drains of this defective character. On the contrary, these should be lifted and relaid wherever found to exist and, where necessary, provided with flushing arrangements, self-acting or otherwise, as the circumstances of each case may require.

With reference to the open grates themselves, it must be remembered that they are frequently applied to sewers in insufficient numbers, so as to throw too much work upon any given opening, instead of effecting a constant and imperceptible interchange between the air of the sewers and the external atmosphere. This I find to be especially the case in sewers laid down during the first twenty years after the passing of the Public Health Act of 1848, in many of which ventilatio[illegible] confined to the 'dead-ends [illegible] more or less effectually thr[illegible] These are now practically [illegible] removal having, however, of revealing the necessit[illegible] general aëration of the management in the dire[illegible] indicated.

Messrs. Atkins & Co., of [illegible] completed the second order for 4,000 [illegible] for the Cape. The filters are of the same pattern as those sent out on previous occasions to Ashantee, Abyssinia, and other parts of Africa, by Messrs. Atkins & Co., and which were highly approved of by Sir Garnet Wolseley.

A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 286.)

AIR.—XXXVIII.

Disinfection by Hot Air (continued).—Another arrangement of Dr. C. M. Scott's Improved Hot Air Disinfecting Chamber for coal is here illustrated. The framework and sides of the chamber and its door are of the non-conducting composite and portable construction referred to under the description given of Dr. Scott's Improved Disinfecting Chamber for gas.

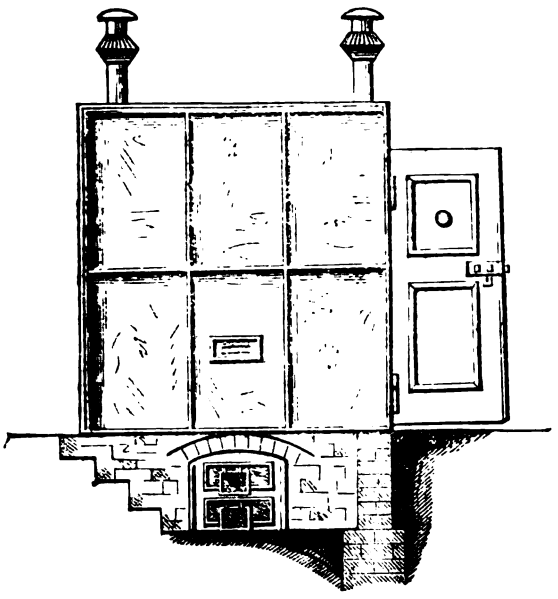


Fig. 2.—Dr. Scott's Disinfecting Chamber (Hot Air System). Coal or Coke Furnace.

The furnace is of peculiar construction, to give off great heat with small consumption of fuel, and the radiated heat from flues is fully utilised. A special arrangement is made whereby the air of the chamber is pass[illegible]ough the [illegible]erms of [illegible]urnace is [illegible]ng doors. [illegible]l furnace [illegible]paratus. Hot Air [illegible]mended Son, of [illegible]urers of [illegible]rangements of [illegible], for Poor-law Unions or [illegible]ever Hospitals, where very rough usage may be given, is also here illustrated, and can be arranged either for a coal, coke, or gas furnace. The interior facing bricks can be of white glazed earthenware, if desired.

For Towns or Poor-law Unions brick-built chambers are provided, and fitted with improved disinfecting appliances, with coal and coke furnace of wrought-iron; sliding furnace and ash-pit doors; improved arrangement with sliding valves for consuming tainted air in furnace; arrangement for evolving sulphurous acid gas if desired; pyrometer; iron-grated floor on rolled girders; two improved composite non-conducting doors and frames, with hinges, bolts, etc., complete with all minor improvements; chimney shafts and metal radiator flues, etc.

Dr. Scott's Improved Portable Disinfecting Chest (see next page) is intended to be used for Cottage Hospitals, or in private houses, where a full-sized chamber is unnecessary. It is fitted with improved gas-heating apparatus, pyrometer, basket-work trays for clothes, and hinged cover. The dimensions of No. 0 are 2 feet by 3 feet by 4 feet inside measure. The chest can also be supplied with a charcoal heater where gas is not available. It is a most serviceable apparatus: it will disinfect clothing and destroy vermin, and may be used in the ward or in a bedroom to prevent the spread of infection caused by the removal of infected clothing or bedding.

The 'Nottingham Self-regulating Disinfecting Apparatus' (see next page) consists of an iron chamber, or chambers, of different sizes, according to requirements—completely enclosed in a wooden case, with five inches of felt packing between, for retaining the heat—into which the articles to be disinfected are placed, and through which a strong current of hot air passes, at a temperature of from 245 to 255 deg. Fahr. Draw-out slides are fixed at the top, for fastening beds to, and slides are attached to the sides, for carrying cross-bars, over which clothes, sheets, blankets, etc., can be hung, or the large baskets provided with each apparatus can be placed. Inlet and outlet flues are attached to the chambers, for the passage of the hot air. The inlet has its connection at the bottom, and is covered inside the chamber with perforated iron plates, arranged in such a manner that the supply of air is equally distributed through all

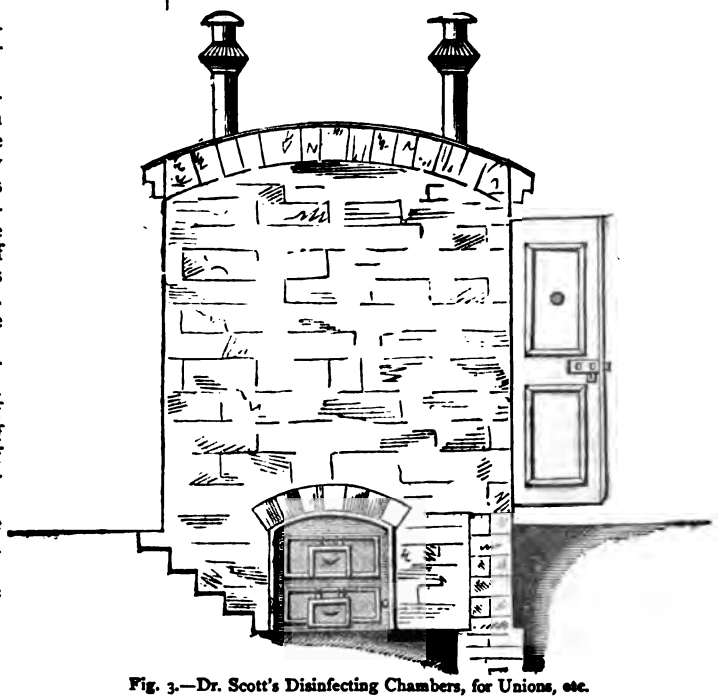


Fig. 3.—Dr. Scott's Disinfecting Chambers, for Unions, etc.

parts of the chambers. In the centre of the inlet flue the gas regulator and a thermometer are fixed, which give the maximum heat of the air entering the chambers—this temperature being

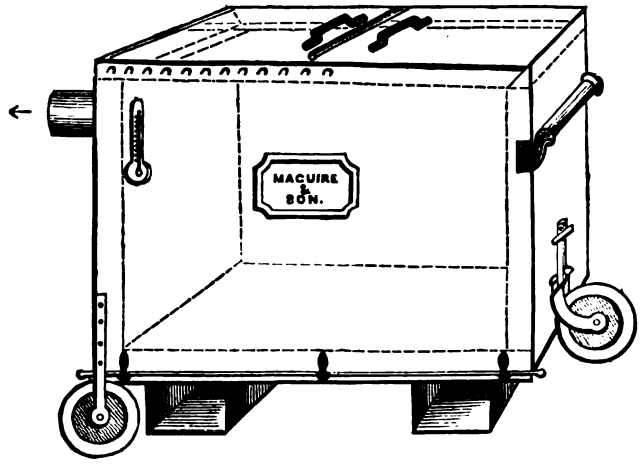
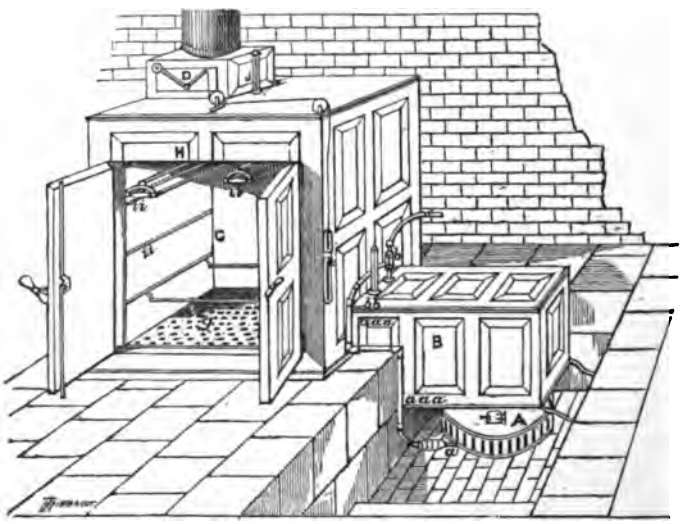


Fig. 4.—Dr. Scott's Improved Portable Disinfecting Chest.

easily raised or lowered by the adjusting of the regulator. The connection of the outlet flue is at the top of the chambers. It is fitted with a valve or damper for regulating the speed of the current of hot air passing through the chamber, a thermometer being



Goddard & Massey's The 'Nottingham Self-regulating Disinfecting Apparatus'.

A. Furnace (cast-iron truncated double concentric). *a*. Atmospheric ring burner; *a'a'a'*, gas supply pipe.

B. Inlet flue, the exposed parts covered with wood and packing; the inner walls of wrought-iron. *b*. Automatic regulator. *b, b*. Thermometer marking the temperature of entering current (or maximum of chamber).

C. Hot chamber, a cubical wrought-iron box, cased with packing and wood. *g*. Inlet aperture, with perforated plate. *h*. Outlet aperture. *i, i*. Arrangements for suspending or supporting articles to be disinfected.

D. Outlet flue, the exposed parts covered with wood and packing, the inner walls of wrought-iron. *j*. Thermometer measuring temperature of out-going current (the minimum of chamber).

fixed in the centre, which gives the minimum temperature. A safety apparatus is also fixed in the outlet flue, in case of articles which are being disinfected taking fire, through having a match concealed in them, the temperature here being then the highest. It consists of a fusible link, which melts at 300 deg. Fahr., the breaking of which closes the outlet and inlet flues, and, by another self-acting movement, shuts off the supply of gas and rings a bell.

The furnace for heating the air consists of a double-cased cast-iron cylinder, with cast-iron webs, attached to the sides, through which the air passes after being heated, by a large atmospheric gas ring burner, the inlet of air being obtained through a regulating grating at the bottom, the sizes of these holes being exactly calculated so as to admit the same quantity of air that enters through the grating at the bottom of the furnace, after allowing for expansion and friction.

EIGHTEEN YEARS' EXPERIENCE OF THE BOARDING-OUT SYSTEM.

By Wm. D'Esterre Parker, Esq.

At a meeting of the Board of Guardians of the Cork Union held on Thursday, 5th August 1880, T. H. Gallwey, Esq., in the chair, the following Report of the Boarding-out Committee was read, and unanimously adopted.

The annual inspection of the boarded-out children presents an opportunity of furnishing the Board with particulars concerning them. The Committee, in the first instance, desire to mention that the pecuniary cost of this mode of rearing the pauper child is less than the cost in the workhouse. For instance, the average cost of each child in the workhouse is 3s. 6d. a week, or by the year, £9.

The following is the scale for those boarded out: Infants under two years of age, 13s. 4d. a month, or £8 a year; children over two years and under five years, 11s. 6d. a month, or £6 14s. a year; children over five years, and up to thirteen years, 12s. 2d., or £7 6s. a year. These several sums include clothing and school fees. The supervision of the children, which is an all-important element in the entire system of boarding out, is carried out in a thoroughly satisfactory manner, through the agency of the several relieving officers, assisted by the local clergymen of the several parishes where the children are located, and wherever practicable the assistance of those ladies who take an interest in the welfare of the ch
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case was brought before the Board, and the girl was transferred to a new foster-parent, and is going on well.

The children, when old enough, are sent to the National schools in the several parishes, and the re-

lieving officers are obliged to see that they attend regularly, and in case of not doing so, they report to the Committee, who duly inquire into the matter. The children are periodically examined by the several dispensary medical officers, who report in a book, specially provided for the purpose, the state of health of each child; and in case of any sudden illness, the medical officer immediately attends to the child. In this particular branch of the boarding-out system the Committee] desire to convey to the Board their warm approval of the unceasing attention, and, they may add, paternal care of the several medical officers to those children. With regard to the several localities in which the children are placed, the Cork Union, which includes the sea-side districts of Passage West, Glenbrook, Monkstown, Ringaskiddy, and Carrigaline, as well as the inland districts of Ballincollig, Blarney, Dripsey, Carrignavar, and the mountain ranges of the commons, presents the most favourable positions for insuring healthy homes for the children, while the number of small farmers and well-to-do labourers who apply for the children are so numerous that the Committee are enabled to select, without difficulty, persons of really good character, who have shown that they regard the proper care of the children as of paramount importance. These foster-parents are recommended by the clergymen, the Poor-Law Guardians, the medical and the relieving officers of the divisions, and a record is kept in a book specially provided for the purpose, showing the several parties who recommended them.

The Committee proceed to submit to the Board the results accomplished since 1862, when first the Boarding-out Act was put into operation. From that period up to the present there were 650 children removed from the Workhouse and boarded out in the several districts above-mentioned; of this number there are 209 at present boarded out, 417 have been adopted by their foster-parents, and are going on well, 20 died, and 4 have returned to the workhouse, and now are ready to go out to service.

The following is the report of Dr. Callaghan, the medical officer who has the special charge of the infants in the workhouse :—

'June 26, 1880. I, this day, inspected the children brought in from the country, and found them in excellent health. Their clean appearance and happy faces testify to the care taken of them. Some of the nurses informed me of their intention to adopt those children now in their charge.

'(Signed) R. Callaghan, Medical Officer,
'Cork Workhouse.'

Since the date of the annual inspection, all those children who have attained the age of 13 years, have, [illegible]plication of their respective foster-parents, [illegible]m, and the ratepayers cease to [illegible]ir support, while the [illegible]n robust health and [illegible] from the ranks of

[illegible]ttee have great cause [illegible]rivileged to undertake [illegible]ing-out regulations, in selecting happy [illegible]se children, where they have been, and are, brought up as members of an industrious, thrifty family, and treated with the like affection as the children of the foster-parents; and they record with pleasure the valuable assistance which they have received from the several clergymen, ladies, medical and relieving officers of the several districts, in the selection of the foster-parents, and in the constant visiting and inspection of the children; and after an experience of eighteen years in the practical working of the boarding out of these children from the earliest period of infancy to the age of eleven years, the Committee, in the strongest possible language, recommend the system to the earnest consideration of the Board, in the hope that they will urge the Local Government Board to bring the subject before Government, and show the vital importance of having the provisions of the Boarding-out Act extended to all children, especially to suckling infants whose parents have become inmates of the Workhouse, and who, by reason of mental or bodily infirmity, or inability to earn their own livelihood, are incapable of bestowing proper care upon their offspring.

BRIEF NOTES ON THE ORIGIN AND SPREAD OF AN OUTBREAK OF DIPHTHERIA.

By F. A. McEwen, M.B., C.M.,
Medical Officer of Health, Alnwick and Canongate Urban Sanitary Authority.

THIS painfully interesting disease, at least, painfully interesting to those who have seen it in its most virulent form, cutting off whole families in periods of time varying from a few days to a few weeks, bids fair now to be better understood than it ever has been. It is to be hoped that, with clearer views of the etiology of the disease, the treatment may be more successful than in a great many instances it has hitherto been, and that in a short time medical men shall be saved the pain of seeing strong healthy subjects suddenly cut off by a disease that in its worst form has so fatal a tendency.

It fell to my lot to observe a peculiarly interesting and fatal outbreak of diphtheria in a rural district in the north of Scotland in the Autumn of 1878. The burden of the outbreak fell on a brother country practitioner. It was in the month of August that the disease broke out at a farmhouse in the county of Aberdeenshire. Most of the individuals about the farm (including the servants) were adults. Within a short time, of nine individuals who were attacked, seven died. My friend the medical practitioner in attendance at this time delivered the wife of a mechanic who lived at least five miles from the seat of the outbreak. Within a few days of her delivery, diphtheria appeared in the family, and in a few days more the father and five children were dead of diphtheria. About the same time he also attended in her confinement the wife of a farm labourer in a small village further away from the seat of the outbreak. Here, too, not many days afterwards, diphtheria attacked the family and carried off father, child, and mother. I here assisted my brother practitioner to perform tracheotomy, in the hope of saving the man's life. While in the house the wife complained of being ill and having a sore throat, and on looking into it there were diphtheria patches to be seen. I learned afterwards that she also had diphtheritic patches on the vulva. I believe there was also another instance of the unfortunate coincidence of the disease following so fatally in the wake of the obstetrical track of the practitioner in attendance at the seat of the outbreak. This 'unfortunate coincidence', as I called it at the time, in some notes on the treatment of some of my own cases contributed to the *Practitioner*, seems to me now more forcibly than it did even then

to be more than a coincidence, and I strongly incline to the view that the public took at the time, viz., that the Doctor was the medium through which the infection was carried from the original seat of the outbreak. Nothing satisfactory as to the origin of the outbreak itself could be learned, though there was a popular notion held by a number of people in the neighbourhood that the water used at the farmhouse where the disease first appeared had been contaminated by the decomposed body of a calf said to have died of some throat disease a considerable time before, and to have been buried in such a position that the moisture from it might contaminate the water in the well from whence the drinking-water was drawn. Popular notions are apt to be despised, and in this particular case I know the notion was despised by those whose opinions were, or ought to have been, of most value. Nevertheless, it is quite possible that the particular organism which at first caused the outbreak of diphtheria was here generated according to the popular view held at the time, and also that, owing to an innocent want of due caution on the part of the medical attendant, these germs were by him carried far away to other homes, there to develop. Personally I had these suspicions at the time, and I took every precaution, by washing my hands carbolically after seeing a patient with a sore throat of any kind, and by never attending a midwifery case in clothes that I had on when seeing a case of diphtheria.

THE DRAINAGE OF COUNTRY VILLAGES.

FILTRATION *versus* CESSPOOLS.*

By G. A. KENYON, M.B.Lond., L.R.C.P.Lond.,
Medical Officer of Health for Chester and Associated Sanitary Districts.

THE bane of existence in country places and suburban districts is the cesspool tank on the house premises. The transition of feeling experienced by the sanitary reformer in passing from a region of ventilated self-cleansing sewers to a region of cesspools is like the passing from light to darkness, or even from life to death. Much as the uninformed householders may scorn the idea of anything being wrong with their domestic arrangements, the time will surely come, to some at least of them, when the subject will become one of grave anxiety—a time of typhoid fever, diphtheria, pyæmia, or puerperal fever.

However unsuccessful the Rivers Pollution Act may have been in improving the condition of our streams and rivers, it certainly has tended to aggravate the evil referred to. When the householder or village community is threatened with proceedings under the Act, the readiest, and perhaps to them the only conceivable, course of action is to construct a cesspool. A still more powerful agency, leading to the perpetuation of this sanitary monstrosity, is the antiquated clause drafted into the Public Health Act from primeval statutes, ordering that if there be no public sewer, nor the sea, *within a hundred feet* of the house, a cesspool must be constructed. All Bye-laws founded on this Act, even the model Bye-laws of the Local Government Board, advanced as they are in many respects, inevitably fail here, and do worse than fail, as narrowing the issues and compelling attention to the above-mentioned enactment.

The remedy for this state of things, I wish to point out, can only be sought by a plan of filtration. Sewage filtration on the small scale has been said to be a failure; but so may all systems of filtration which neglect the essential elementary principles of intermittent action and alternate aëration.

Deep intermittent filtration is found to work successfully at the outfall of a main sewer; and I wish to suggest that places where the population is too scattered to admit of sewerage, and yet, where simpler methods of irrigation or sub-irrigation are for various reasons impracticable, may be effectually provided for in detail by, so to speak, bringing a section of a deep intermitting filtration area to each house or group of houses—a section proportionate to the number of people, on the calculation settled by authority and experience, that one cubic yard of earth or other suitable material will purify eight gallons of sewage in the twenty-four hours.

The material may be enclosed by brick walls, the liquid distributed through porous drain-tiles near the upper surface, and withdrawn by similar tubes placed below. Intermittent action should be secured by some form of flush-tank, worked, for instance, by Mr. Rogers Field's annular syphon, or one of Mr. Isaac Shone's inventions. Aëration will only be secured by keeping the filtering bed above ground, if the land lies flat and is of a wet character. It is essential that the filter bed should drain dry. The drain-pipes may sometimes have to be carried above ground, in order to deliver at the raised level of the filter.

For villages with a sewer the outfall of which is at fault by reason of discharging into a river, the same principles may be applied, and it may in such cases be necessary to resort to mechanical means for lifting the sewage. This can no doubt be effected with little supervision by a small turbine and centrifugal pump, or even by a gas engine. An arrangement of the kind suggested for a singie house has been working successfully for twelve months in one of my own districts.

* Read at a Meeting of the North-Western Association of Medical Officers of Health, at Manchester, February 9th, 1881.

A SERIES OF REPORTS ON SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

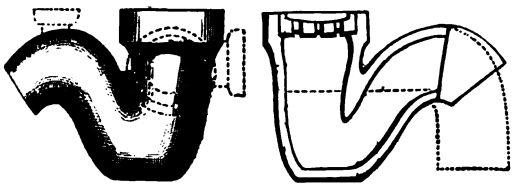
III.—LAMBETH HOUSE DRAINAGE INTERCEPTERS AND DISCONNECTORS.

THESE intercepters and disconnectors are of two kinds, one class being used for the disconnection of the various services of a house from the house drain, and the other class forming the more or less complete disconnection between the house drain and the sewer or sewage outfall. As a matter of course the former are simpler in pattern than the latter, and they perform multitudinous work. There are many patterns sometimes necessary round about a house, whilst, on the contrary, there is seldom more than one main disconnection between the house drain and the sewer.

The oldest and most extensively used intercepter is that of a yard gully, the simplest form of which, made at Lambeth, is the No. 13 gully here shewn. The section shows a pattern for connecting with a shallow drain, and also a deepened outlet to junction with a drain laid down at some depth. The elevation shows some improvements which have been made on

this common gully by Messrs. Doulton, and which have been of immense benefit to the trade. For instance, beside the inlet at the top, where the ventilating iron grid is, two other inlets have been added at the back and side which act admirably for the disconnection of sinks, baths, and lavatories.

Nothing could better disconnect these wastes from the house drain, as they deliver over the trapping water, and should this hydraulic seal fail for a time the open iron grating would prevent any smell entering the house. In cases where it is required Messrs.



Elevation. Fig. 13. Section.

Doulton have added a place to insert a ventilating pipe, which is occasionally of great value. The full value of even a simple gully such as this cannot be fairly reckoned up until it is compared in a practical way with the abominable bell trap which obtains nearly all over older London, and which has worked destruction to health to an extent not to be computed. In the bell trap no disconnection is possible, because the sink, bath, or lavatory wastes, if they deliver into the drain at this point, must deliver underneath the trapping water, thus leaving a highway into the house for drain and sewer air, which no trapping under the sinks, etc., can effectually withstand. In short, the bell trap is a dangerously perpetuated blunder, and the insertion of one by a builder in a yard or area only proves his ignorance of the superior gully pattern, with its absolute safety.

Gullies for use in yards and areas have, however, to be sometimes larger, and two of these are known as No. 19 square and No. 15 round gully. The smaller and square-shaped is made when wished for with an inlet at the back, and the sizes of the outlet pipes of both patterns can be had enlarged. For positions of aspect on which the sun plays long or fiercely, No. 19 is preferable, because less of the trapping water is liable to evaporation.

But for all purposes in our country No. 15 is admirably suited, and possesses several advantages over the others. For instance, the stoneware dished cover, with its iron grating, is made separately from the body of the gully, and in consequence of this, discharging pipes from sinks, baths, and lavatories,

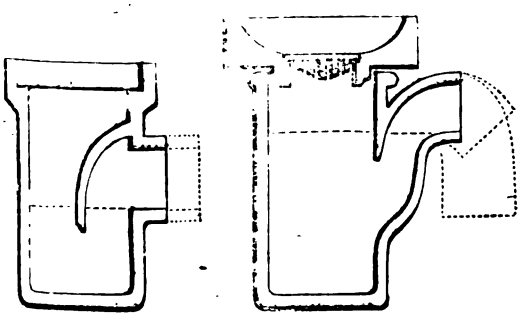


Fig. 19.—Square. Fig. 15.—Round.

can be made to deliver between the two by simply concreting there or interposing a piece of stone. Nothing can be more cleanly than this dished cover with iron grating, and so well are they known by sanitary builders that they will very often purchase this Lambeth article to fix over the gullies of other makers.

It will be seen from the formation of the above-mentioned gullies that the inlets from sinks, etc., are provided for underneath the grating. Of course this is not always so, as any waste pipe can deliver along the top of the yard surface, and so find its way into the gully. But this is mostly objectionable, as it slops the yard and area and is not a cleanly system.

Fulfilling the purpose for which the gully is the most useful, which may be said to be when it is in the middle of the yard, and conveys also the surface-water to the drain, Messrs. Doulton have devised the Reversible Intercepter, which is mainly intended for use where the pipes descend alongside the wall, and where it would be very inconvenient to carry them into the centre of the yard or area underneath the ground. The Reversible Intercepter is com-

Fig 32.—Reversible Intercepter.

posed of two pieces of stoneware, the lower piece forming the trap, and the upper piece, which may stand above the ground, acting as the receiver. These articles are, therefore, not only intercepters, but disconnectors.

Fig. 13A.—Reversible Intercepter.

For example, in either Nos. 32 or 13A, there would be such a disconnection as would be afforded by a complete disconnection, and if the wastes of upstairs-sinks (not being urinal sinks) baths, lavatories, and even cisterns, were led into it, no mischief need accrue. Besides, the rain-water pipes could be led into it disconnectedly, so as to keep it well cleaned out, and it would have in this case the advantage of intercepting any small matters which have descended the rain-water pipe from the roof. Of course, everything would be ventilated at the gratings on the top.

Messrs. Doulton have, however, devised an improved Rain-Water Shoe, which both receives the down-pipe and ventilates it at the ground-level. This article, No. 33, is most useful for the purpose, and cases might even occur where it might be con-

veniently trapped just past the ventilating grid, in order to remove the silt, rotten leaves, etc., from the roof. In its present form it is admirably adapted for

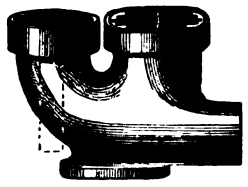


Fig. 33.—Rain Water Shoe.

fixing at the foot of all rain-water pipes which lead direct to an underground rain-water tank, as the ventilating grids on the shoe would provide an air-outlet from either the tank itself, or from any interposed filter.

So many thousands of Mansergh's External House-Protecting Drain-Trap, No. 24, are manufactured by Messrs. Doulton, and so valuable is the duty which it performs as an external disconnecting trap for sinks and similar wastes, that it deserves a mention, and an illustration. In this most useful

SECTION. A. B

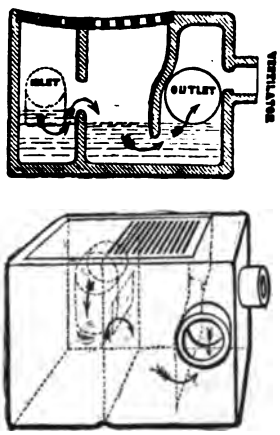
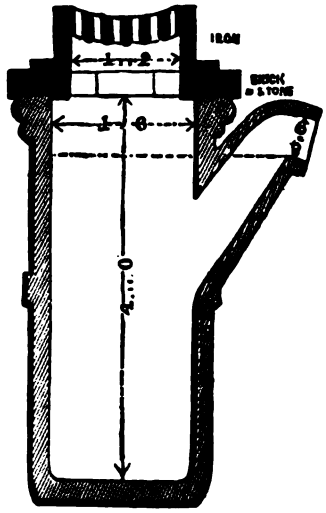


Fig. 24.

contrivance the wastes from baths, lavatories, or sinks deliver into a separate chamber in connection with the central or ventilating chamber, and the outlet is duly trapped back from the latter, whilst, to make assurance perfectly sure, an opening for a ventilating pipe is attached to be used when required, which would not of course be the case if this trap delivered into a main disconnection trap, such as will form the subject of our next notice.

Our list of gullies would not be complete without a notice of the extra-strongly made, improved street-gullies, manufactured at Lambeth by Messrs. Doulton. The object of these is to cut off the gutter-gullies in streets from the street-sewers, and to prevent the return of any foul air present in the sewers by the trapping water, the level of which is shown by the black, dotted line. This trapping-water space is made extra deep in order to provide a receptacle at the bottom for street-silt, or road detritus, and sometimes the outgo is provided with a flap, as an additional precaution, when the sewer is imperfectly ventilated in its crown to the surface of the street. Too often, indeed, the street-gullies, formed in brick-work, become defective and leak, and one incorrigible sinner that we know, at the bottom of



Lowndes Square, has frequently flooded a front area there, nor was the cause of the mischief removed and prospectively prevented until one of these gullies was inserted.

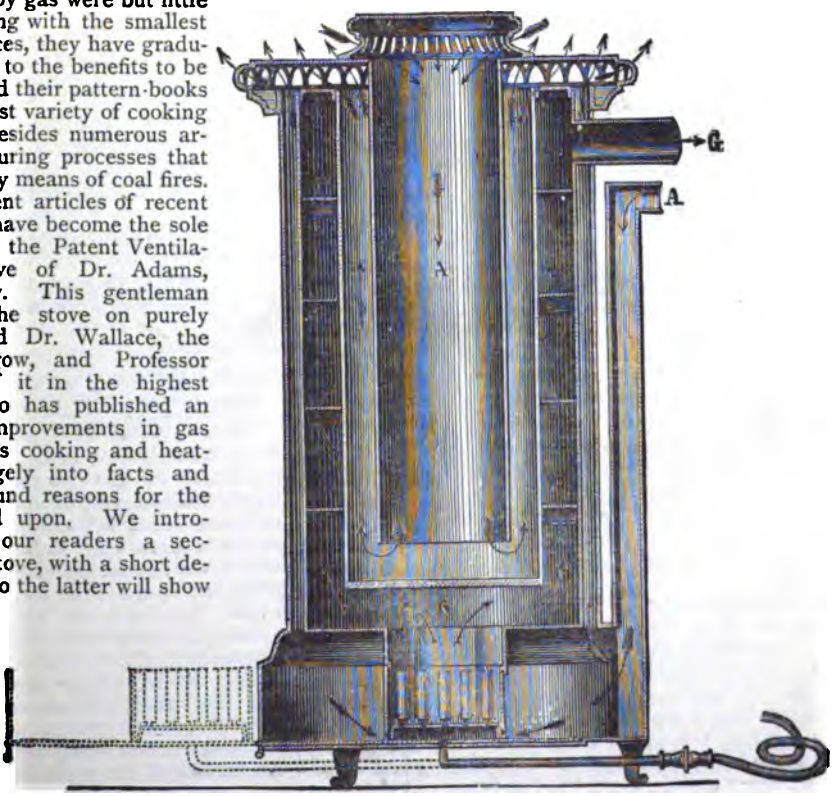
GAS COOKING AND HEATING APPARATUS.

IN the approaching exhibition at South Kensington of stoves, grates, and other appliances for the abatement of smoke, gas apparatus will no doubt form an important item in the display. We have no data to fix the year in which the first gas-cooking stove was made, or the name of the manufacturer. Probably about forty years since would be a reliable time to fix for their introduction, and it is certain that Leeds was one of the earliest towns to take up their manufacture. At first the innovation, as with most new ideas, was looked upon with a considerable amount of prejudice, and it was not until after many of our public institutions, hospitals, workhouses, etc., adopted this mode of cooking that the general public could be prevailed upon to entertain the system. A long education in the small boiling stove proved to be necessary, ere our housewives would bring their minds to believe that a chop or a steak could be succulent or without taint if cooked by means of the aëriform fluid. But the great impetus given to the sale of these articles amongst the general public, and the many improvements that have been made in them, have been much increased by the numerous gas exhibitions that have been held throughout the kingdom during the past few years, notably in those towns where the supply of gas is in the hands of the municipal authorities; and we now find gas companies and corporate bodies competing with the local tradesman in their sale, and actually lending them out on hire at a yearly rental. During the last decade the large business establishments, hotels, restaurants, clubs, etc., who have adopted gas apparatus have year by year increased, and are now entirely dependent upon gas for the supply of their daily wants, and it speaks well for the new adaptation that wherever laid down the most satisfactory results have accrued, nor do we remember ever to have heard of a single case in which either principals or servants would desire a return to the coal fire. Time, labour,

dust, dirt, etc., are all reduced, and the saving effected in cost is in many instances a most important feature, notwithstanding the price of gas. But it is not to cooking-stoves only that these remarks apply. Heating-stoves have been introduced with similar success, more particularly in the form of gas fires, with asbestos and fire-clay clinkers, applied to our ordinary grates. These are largely increasing in sale, one London firm alone, Messrs. Verity Brothers of Regent Street, having fixed nearly 30,000 of their patent gas fire. The amount of smoke that has been prevented from passing through our chimneys by the use of gas stoves must be considerable, and will materially assist the movement the National Health and Kyrle Societies have in view.

Messrs. John Wright & Co.'s Gas Cooking and Heating-Stoves.

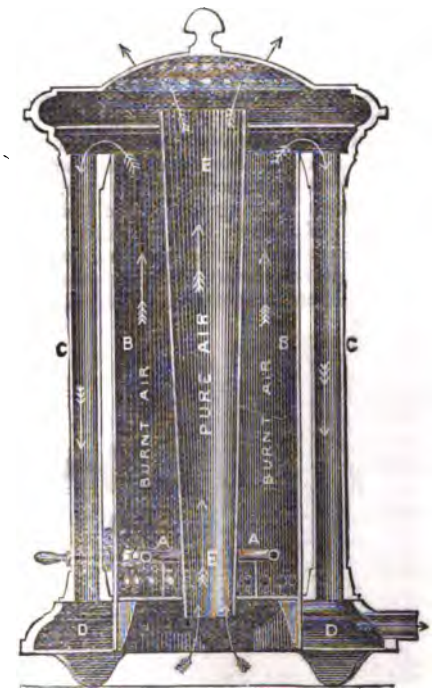
In discussing the merits of gas apparatus, we must not omit to mention the names of Messrs. John Wright & Co., of the Essex Works, Broad Street, Birmingham, and Upper Thames Street, London, a firm who have done as much as any to disseminate gas cooking and heating stoves amongst the general public. Situated in the very heart of the hardware districts, with coal, iron, and fire-clay almost at their doors, or with 'all appliances and means to boot' at command, it is not surprising to find them in the front rank of their trade. Commencing this business at a time when the advantages of cooking and heating by gas were but little understood, and beginning with the smallest and most simple appliances, they have gradually educated the masses to the benefits to be derived from their use, and their pattern-books now teem with the greatest variety of cooking and heating apparatus, besides numerous articles for use in manufacturing processes that were originally effected by means of coal fires. One of the most prominent articles of recent invention, of which they have become the sole licensees and makers, is the Patent Ventilating Gas Heating Stove of Dr. Adams, L.R.S.C.E., of Glasgow. This gentleman claims to have built the stove on purely scientific principles, and Dr. Wallace, the gas analyst for Glasgow, and Professor Dittmar both speak of it in the highest terms. Dr. Adams, who has published an elaborate treatise on improvements in gas stoves, and their value as cooking and heating mediums, goes largely into facts and figures, and adduces sound reasons for the principles he has acted upon. We introduce to the notice of our readers a sectional illustration of his stove, with a short description. A reference to the latter will show that it consists of four casings (two outer and two inner), and the space between these casings forms a tortuous flue, by which the burnt products slowly find their way to the outlet G. The fresh air which is to be heated enters it at two different places, each of which has its separate delivery. One of these is at the pipe at the back marked A, down which a current of cold air is constantly passing, a small portion being taken up by the burners to promote combustion, and the remainder carried upwards between the *outer* casings, is warmed in its passage and discharged in a heated state through the openings at the top indicated by the arrows. The second stream enters at the summit of the stove, and descends through the central tube or casing to the bottom, when, becoming heated, it is reversed and drawn upwards in the second casing, and again admitted into the apartment through similar openings as provided for the other current. The dotted lines at the bottom represent the arrangement for preventing explosion in lighting. The entire furnace chamber is drawn out on a sliding drawer, and the gas is inaccessible for lighting except by this means.



The construction of the stove is certainly novel and ingenious, and the burners differ materially from any others in use in similar apparatus. Dr. Adams employs a group of fire-clay tubes enclosed in a chamber where only the necessary amount of air to promote combustion is admitted, and on the surface of these tubes the mixture of gas and air burns. After being lit a few minutes the tubes become incandescent, the flame nearly disappears, and the walls of the combustion chamber also become red-hot. Experiments made in Glasgow with this stove against others of the best construction in the market, showed that Dr. Adams's, burning 12½ cubic feet of gas per hour, yielded 285 cubic feet of pure air warmed 180 deg. Fahr. above initial temperature, for each cubic foot of gas consumed, while two others, burning 10½ and 13½ feet respectively, yielded, in the one case only 59 cubic feet of air, warmed 62 deg. Fahr., and in the other case 48 cubic feet, warmed 132 deg. Fahr. above initial temperature. Dr. Adams' stove can be seen at Messrs. Wright's London warehouse in Upper Thames Street.

The 'Imperial' Ventilating Gas Stove of Messrs.

Wright's own invention, which we also illustrate, is another notable article of the same class, and is a very handsome stove. Independent of the main cylinder, it has a series of hollow columns, with Corinthian capitals, springing from an ornamental base, and supporting an elaborate top, the pillars being entirely separate from the main body, but each forming a portion of the heating surface. Through the centre of the stove runs a cylindrical chamber, carrying a constant stream of fresh air to the top, which is discharged by means of perforated openings in it. Next to this is a circular chamber, having the gas burners at the bottom, and through this the burned air rises, but being arrested by a plate at the top it is reversed, and descends through the pillars before mentioned, and enters an annular flue at the



bottom, from which it passes out from a nozzle to the chimney. It will thus be seen there is radiation from the outer case of the main cylinder, and from each of the columns or tubes before mentioned, and the outlet being at the bottom the burnt air is utilised to its fullest extent, and the maximum amount of heat extracted from it before it is admitted to the flue. This is a less expensive stove than the Adams patent, and we entertain a high opinion of its capabilities.

Another invention of Messrs. Wright's for heating purposes is a Fire Screen Ventilating Stove, of which we attach an engraving. It is ornamental in character, and may be used merely as a fire screen, or for its legitimate purpose of a heating stove. The gas burner placed within the casing is a straight bar running the whole width of the stove, attached at one end by a swivel joint. The interior is divided by a plate running parallel to the front, and rising to about two-thirds of its height. By this means the burned air is made to pass up the front of the stove, and descend at the back, and then to rise again by the flue, so that a large radiating surface is secured. It occupies but very little space, and can be placed in front of any fire-place. As a means for warming and ventilating bedrooms, or for any place where space is an object and a more ornamental article is required than the usual shaped stove, it will be found

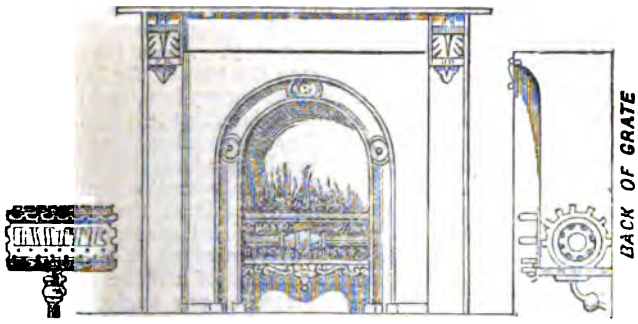
most useful, and all the products of combustion can be carried off by the flue. The height is 36 inches, and the width 23 inches, the depth being only four inches.

We have selected these inventions of Messrs. Wright and Co. as forming some of the most interesting features of their heating apparatus, but their pattern book contains an almost endless variety of all kinds of heating stoves and gas stoves known to the trade, from the most simple and inexpensive upwards. In cooking appliances the firm are equally efficient, and these are made from the most simple boiling stove, through the various grades, to the apparatus suitable for a large establishment, all of which may be seen at the London warehouse, 155A, Upper Thames Street.

Messrs. Verity Bros.' Gas Fires, Circulating Boilers, Hot Water Coils, & Ventilators.

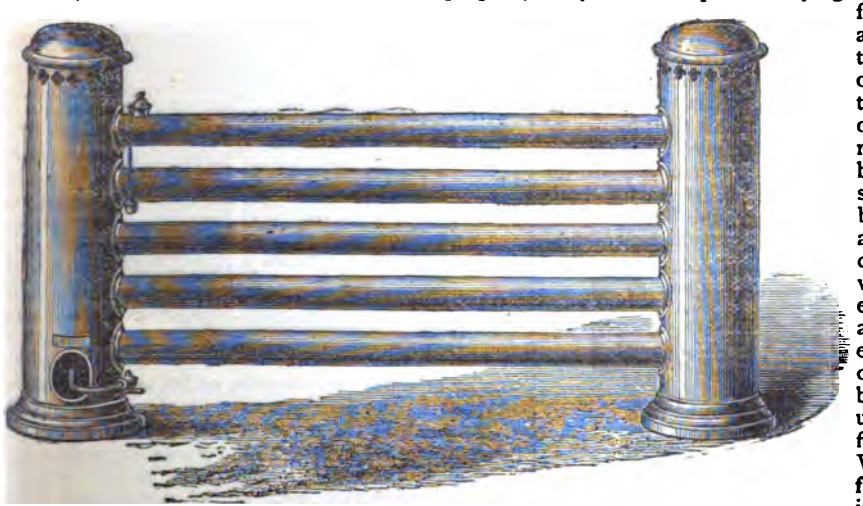
Messrs. Verity Bros. of Regent Street, and Stanhope Street, Euston Road, have achieved considerable reputation for gas fires, circulating boilers, and hot water coils, as well as ventilators both for hot and cold air. They will exhibit one or two new features at the approaching Exhibition. Their gas fire, of which we submit an illustration showing front of grate and fire, section of grate and burner, and for which they hold the only patent that we believe exists in this country for such an article, has been very extensively sold, as we observed in the earlier portion of this article, nearly 30,000 of them being in use, and the number constantly increasing. They are very simple in construction, one burner only, an atmospheric one, being used. This is passed through the bottom of the grate, and connected to a block of fine fire-clay shaped to suit the outline of the front bars, and pierced with a number of small holes, through which the gas passes and burns. The remaining portion of the grate is filled up with the ordinary asbestos and fire-clay lumps. It is claimed that this fire is produced at less cost than others of an imitative character, as the fire-clay lump which forms its

basis, is, so to speak, fuel itself, and gives out intense heat, requiring less gas to be consumed, and giving off neither smoke, smell, or dirt, as almost perfect



VERITY·BROS·PATENT·GAS·FIRES.

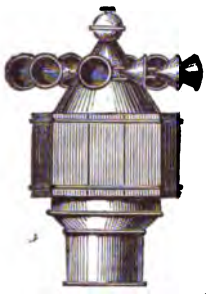
combustion is obtained. At the same time, an exact imitation of a coal fire is produced. It is a significant fact, that a large number of these fires are in use in the houses (including bedrooms) of the medical profession, and of scientists generally. The hot-water coil by the same firm, in which gas is also used for the heating power, while retaining the outward appearance of others made for the same purpose,



is ingeniously constructed as regards its interior arrangements, and is designed to produce the greatest amount of heat with a minimum consumption of gas. From a size suitable for a small hall, the same principle is extended to the largest requirements, and, taking the lesser ones as an example, beyond the fact that a connection must be made from the nearest gas-pipe or burner, they are portable, may be removed to any part of the house, and form a complete hot-air stove. One important fact must not be lost sight of in these apparatus; the common fish-tail burner is used, and the first plate on which it plays is sufficiently far removed to prevent smoke or carbon collecting, and from its ultimate passage through the tube, no worse effects can accrue than in the burning of gas in the ordinary manner from a gasalier, rendering an outlet product pipe quite unnecessary. Our illustration shows the general outline. As in all apparatus of this kind, the boiler is the principal feature, for on the construction of this depends the efficient working of the stove. This is of a conical form, and is placed inside the tube supplying the heat from the burner. It is intersected to the top with water-ways of a flat form, so arranged as to give the appearance of a spiral staircase, and were we to draw a line from the lowest to the topmost intersection, we should obtain a curve that may be compared to the baluster of the staircase. These coils are made with copper tubes and brass circulatory pipes, and are of the best material and workmanship.

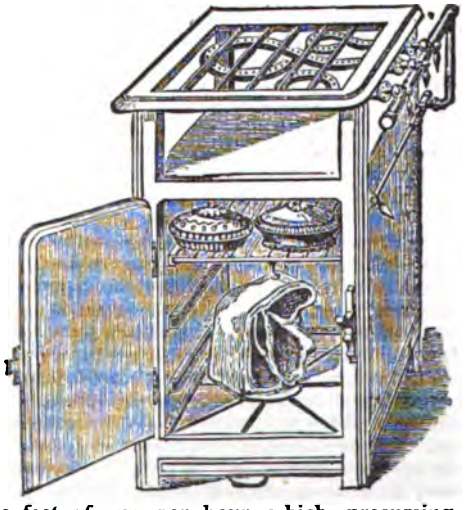
A new invention of Messrs. Verity that will doubtless attract much attention is a combined ventilating and heating apparatus, which can be used for discharging pure, warm, or cold air into different apartments, according to the season of the year. Unfortunately, no illustrations of this article are ready, but the arrangement is so simple our readers cannot fail to follow us in our description. Imagine a circular stove of sheet iron about four feet high, and two feet diameter, the centre consisting of a vertical tube of fire-clay about three inches thick, the interior forming the furnace, surrounded by a chamber about five inches diameter, with sheet iron walls, and another beyond this about three inches diameter, forming the exterior, a chimney on the top for carrying off the products of the furnace, and an inlet at the back near the top for the admission of air, and we have the principal contour of the stove. The furnace has a fire-brick bottom, making it a slow combustion stove, but the draught being admitted by a sliding door in the front, its volume of heating power can be increased to almost any appreciable extent, and it will burn coke, coal, or any rubbish that cannot be utilised for ordinary fires. Messrs. Verity's Ventilators for drawing fresh air into a building are now brought into requisition; these are so well understood we need not describe them here. It is sufficient to say that the waste water used to actuate the fan is made to fall in minute sprays over the in-let air pipe, thus washing or cleansing the air before it enters the receiver. Inside, the outer chamber before described is formed into a spiral way or *duct*, down which the air passes, and at the bottom it is transferred to the second chamber similarly arranged, but here it is drawn upwards, and now being next to the heated fire-clay and thoroughly warmed by the time it arrives at the top, is carried by pipes to the various apartments in which it is required. This stove is capable of delivering 450 cubic feet of hot air per minute at any temperature up to 250 deg. Fahr., and it can be utilised in summer for discharging cold air in the same manner. A similar apparatus is made to burn gas, with like effect, using twenty-five feet of gas per hour when full on, and delivering 200 cubic feet of warmed air per hour at same temperature, which can, of course, be reduced in temperature

at pleasure. One other invention of Messrs. Verity is worth notice, viz., a Combined Screw and Fan Exhaust Ventilator, for which they claim especial advantages. This is worked by a series of cone buckets fixed around the ventilator, and the arms or stretchers by which the cones are extended are also grooved to give additional force. The heated air on emanating from the roof is first caught by the Archimedian shaped screw, and carried to the fan above, which completely throws it off. Messrs. Verity maintain that in practice, and by means of trials with the aërometer, it has been proved that the screw alone only disposes of two-thirds of the vitiated air, the remaining one-third being retained in the building, but by their improved method all is effectually drawn out.



Messrs. H. G. Davis & Co.'s Gas Heating and Cooking Appliances.

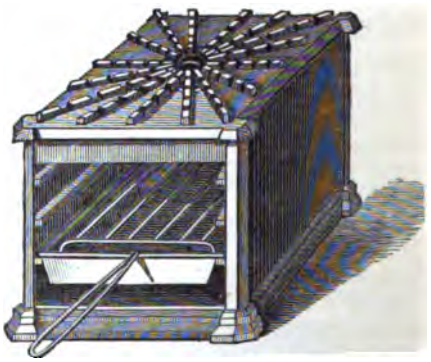
A London firm who have distinguished themselves as manufacturers of gas heating and cooking appliances are Messrs. H. & C. Davis & Co., of the Camberwell Road. Like most metropolitan makers, their goods are carefully and substantially manufactured, and several improvements are visible in their arrangements. Their 'Metropolitan' cooker, made in three sizes, is a stove for which they have gained much popularity, and which has been adopted by several gas companies, who follow the practice of letting stoves out on hire. The size we illustrate is capable of cooking for twenty persons, performing the processes of roasting, baking pastry, boiling, frying, etc. The roasting and baking, it is affirmed, are accomplished with a consumption of only



nine feet of gas per hour, which, presuming the apparatus to be at work for three hours, would not cost three-halfpence, at the average price of gas. These results are obtained by the improved construction of the different parts. The stove is packed all over with a non-conducting material, so as to prevent the escape of heat through the outer casing; the door is made with a rebate, which closes it more effectually, and prevents the ingress of cold air; and a self-acting latch renders imperfect shutting impossible. A throttle-valve worked by a rod at the left hand side regulates the amount of air to the oven for roasting or baking, and the rod at the right hand turns an independent cock for lighting the oven, to prevent its being mistaken for either of those used for the hot plate. Above the roaster is a space for grilling, etc.; the bars of the hot plate are made of oval instead of square iron, and being fixed in their frame edgewise intercept less heat.

A restaurant grill and general cooking stove combined is another result of which this firm make a speciality. In this arrangement a large oven or roaster with double doors is at the bottom, and above that is a large enclosed space, except in the front, enamelled all over, in which is hung the gridiron, suspended by means of a nickel-plated rack, enabling it to be placed at any angle, the burners being fixed over it, and so cooking by reflection. As there are several independent burners to the gridiron, they can be used singly or in concert, according to the quantity of meat being cooked. The apparatus is in addition provided with a hot plate on the top, for boiling, stewing, etc., and having nickel-plated mountings and ebony handles, presents an attractive appearance.

A little griller, with a provision for boiling upon the top, which we illustrate, though similar to many others made by competing firms, is in one particular



worthy of note. The burner, which is, like all others adopted by the firm, an atmospheric one, is inserted at the back of the stove in the form of a flattened tube, giving off a broad blue flame extending over the top of the inside, cooking the viands by reflection, and supplying heat at the same time for the vessel on the top. These small grillers cost but a few shillings, and can be obtained enamelled inside.

Messrs. Davis are also makers of an improved gas fire for open grates. In the majority of these appliances the burners are ranged in one row only near to the front, which causes the asbestos fuel nearest the bars to be heated first, leaving the back portion comparatively cold for some time. Messrs. Davis divide their burners by placing a portion of them at the back, and by this means obtain an incandescent mass in a few moments, the fuel being composed of asbestos lumps. It is claimed that by the burners employed three-and-a-half feet per hour only of gas is burned, as against five feet, the ordinary consumption by the usual arrangement. The firm also manufacture a variety of other useful gas apparatus, both large and small.

Dr. F. Wilson, of Heighington, has been appointed Medical Officer of Health to the Darlington Rural Sanitary Authority, at a salary of £80 per annum.

THE
SANITARY RECORD.
MARCH 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE SANITARY REQUIREMENTS FOR CEMETERIES.

THE Local Government Board have just issued a fourteenth series of Model Bye-Laws for the use of sanitary authorities, the present series relating to the regulation of such cemeteries as may be established under Martin's Interment Act of 1879. The bye-laws themselves need no comment, as they are of the most commonplace kind; but accompanying them is a very exhaustive and able memorandum prepared for the Board by Dr. Franklin Parsons, which deals in detail with the sanitary requirements of cemeteries generally. The dangers to the public health to which places of burial may give rise are of two kinds, viz., the contamination of the air by the gaseous and volatile, and of drinking-water by the liquid and soluble, products of decomposition. To obviate mischief from these causes, it is necessary to have a suitable soil, with proper elevation of site, a suitable position, especially with respect to houses and sources of water-supply, sufficient space, and proper regulation and management. To the discussion of these several points Dr. Parsons gives much attention, and his remarks will have especial interest for Medical Officers of Health who are called upon to report on the suitability of sites for cemeteries. He says of the soil that it should be of an open porous nature, that it should be easily (but not too easily) worked, and should be free of water and hard rock to the depth of at least eight feet. Loam and sand, with a sufficient quantity of vegetable mould, are the best soils, clay and loose stones the worst. The most important points with regard to the situation of a cemetery are its proximity to dwelling-houses and sources of domestic water-supply. The distance of a newly-established cemetery from existing dwelling-houses is prescribed by an Act of 1847, incorporated with the Act of 1879, at two hundred yards; but Dr. Parsons very properly draws attention to there being no corresponding prohibition (as in France) to the erection of new houses within that distance of an existing cemetery. He says, however, that it does not appear that the amount of danger to health from proximity to a well-kept cemetery is large, and there is no reason why a cemetery should necessarily be a nuisance or become a source of danger to the health of those living near it. As to dangers to sources of water-supply, the drainage of a cemetery should not be allowed to enter a stream from which water is drawn for domestic purposes. The degree to which the purity of neighbouring wells is endangered by a cemetery and the distance to which contamination may extend, obviously depends upon the relative elevation of the respective sites of cemetery and well, and upon the nature and dip of the intervening strata. It does not appear, however, that the risks to which wells are exposed from the proximity of a properly managed cemetery is in ordinary cases great. The site of a cemetery should be open and somewhat elevated, so that the wind may blow freely over it. Each coffin should be surrounded and covered by a mass of earth sufficient to deodorise and destroy the putrid emanations proceeding from it, and so great as to make it unnecessary to re-open any grave until the body previously interred therein shall be completely decomposed. The length of time necessary to effect complete decomposition varies according to the nature of the soil, but the regulations of the Home Office prescribe that no unwalled grave is to be opened within fourteen years, except under certain circumstances. There should be a minimum allowance of something near a quarter of an acre of ground for every thousand inhabitants, but it is very desirable to provide more than this bare minimum; and Dr. Parsons recommends that in all cases a strip should be left free of graves fifteen or more feet in width around the interior of the cemetery wall.

STATISTICS OF SANITARY DISTRICTS.

WE are glad to hear that since the beginning of the year local registrars have received instructions from the Registrar-General, which will materially facilitate the preparation of correct vital statistics for sanitary districts. Strange as it may seem, it was previously impossible from the birth and death registers, without intimate local knowledge, to ascertain the number of births and deaths occurring in sanitary districts, except in those rare cases in which the boundaries corresponded with those of registration districts, or sub-districts. Registrars are now instructed so to describe the place of birth or death in the registers, as to indicate in which sanitary district the birth or death occurred. They have been further instructed to ascertain and insert in the register, in cases of births or deaths in public institutions, the 'previous residence' of the mother, or of the deceased inmate, as the case may be; 'previous residence' signifying the place from which the inmate was admitted to the institution. This instruction will facilitate the distribution of institution deaths to the sanitary districts to which they should be referred. There is good ground for hoping, too, that in the report upon the forthcoming census, greater facilities will be afforded to Medical Officers of Health, and others interested in local vital statistics, for ascertaining the proportional age, and sex distribution, of the population of sanitary districts. Death-rates at groups of ages should form an essential part of all local mortality statistics, especially death-rates among children under five years of age. Such calculations, however, are impossible to a Medical Officer of Health, unless he is provided with the age distribution of the enu-

merated population in his sanitary district. Definitive sanitary areas were not created throughout England and Wales until 1872; their importance, therefore, as a unit of sanitary organisation has in great measure arisen since the last census was taken. It is essential, therefore, that the age and sex distribution of the population of all sanitary districts should be given in the report upon the approaching census. With regard to this and other requirements of Medical Officers of Health connected with census matters, it is assuring to bear in mind that the statistical portion of the report will be prepared under the superintendence of Dr. Ogle, himself a Medical Officer of Health, until he was appointed to succeed Dr. William Farr, C.B., F.R.S., in the Registrar-General's office.

THE HOUSE THAT JERRY BUILT.

IT is a standing wonder amongst sanitarians why the Local Government Board are so niggardly in doling out 'urban powers' to rural sanitary authorities—why, in fact, the powers of both urban and rural authorities cannot be made identical. Instances by the hundred are constantly cropping up to prove the evils of the present limitation of the powers of rural authorities, and in no department of sanitary work is this more striking than in the supervision of new buildings. An urban authority has power to make bye-laws that, if properly enforced, would secure the local dwellings from the 'scamping' of the jerry builder; but a rural authority has no such powers unless it can convince the Local Government Board that they ought to be granted to it. Even supposing the Whitehall authorities concede the point—which by no means follows—the mischief is probably done before the authority gets the chance of interfering. The chosen haunt of jerry builders is the suburb of a town just outside the urban limits, where they can run up houses at their will, without the necessity of complying with any troublesome requirements as to soundness of materials, ventilation, drainage, or water supply. A striking example of the state of affairs thus induced is furnished by a report presented to the Local Government Board by Mr. John Spear as to recent building operations at Shadwell, a picturesque and elevated suburb of Leeds. Speculative builders have lately come to recognise the favourable circumstances of the site for their purposes, and have laid up a store of mischief for the future which cannot fail to affect the public health of the place for many years to come. Mr. Spear reports of a row of nine-roomed houses, each with coach-house and stable, that they afforded many evidences of hasty construction and careless workmanship. The drainage was into cesspools, either unventilated or uncovered, in the middle of the gardens. Offensive smells from the drain-gullies close by the kitchen doors showed the bad construction of the drains. The privies and ashpits were of the ordinary midden-stead class. Drinking water had to be fetched from an unprotected dip-well, fed by a spring from the side of a hill, on the top of which other houses, with overflowing cesspools, were situated. This well was situated at a distance varying from 90 to 200 yards from the houses, and was difficult of access. Similar defective conditions were found in other parts of the village. In one row, the houses, sixteen in number, were, although unfinished, fully occupied, with one exception. They were built chiefly on the site of an old and now filled clay-pit. In some of them water, said by the occupants to stink, stood a foot deep in the cellars and underground passages. House yards were not even formed, and the privies, mere cesspits, stood in a sea of mud. Some of these privies were absolutely inaccessible to the tenants (indeed, in the case of several houses, no steps even were provided by which the tenants could descend from their back doors), and the solid and liquid refuse was consequently thrown from the doors on to the surface. Close by, between the houses and the privies, and sunk with the latter in the porous soil, was the well—one to each house—a shallow dip-well, roughly lined with stone. It is unnecessary to condemn a law which can permit such a state of affairs as described by Mr. Spear to go on unchecked; and there seems urgent call for the abolition, without further delay, of the unnecessary, senseless, and vexatious difference between the powers possessed by authorities of urban and rural districts—at any rate, as regards new buildings, which are as liable to be erected in one as in the other.

It is, of course, necessary not only to have these urban powers as to new buildings, but to use them systematically and stringently. A striking instance of the sort of building that might be expected to be general were building bye-laws not enforced, is afforded by a case tried lately at the Edmonton Petty Sessions. A builder was summoned for violating the local bye-laws, and it was proved that the mortar of certain houses built by him was composed of screened lime from old buildings, mould, and a very small portion of lime. The material fell into pieces upon being slightly pressed between the fingers. The plaster upon the walls was composed of mould and screened rubbish from old buildings. The party and internal walls had been constructed nearly altogether of brickbats, but the facing was good. In some of the houses the party-walls were in a dangerous state. Proper timbers had not been used in the construction of the houses. The floor-joists were bad: most of them were of old timber which ought not to have been used, but some of them might have passed if the workmanship had been at all decent. In this particular case the jerry builder was heavily fined; but in many other similar instances he is, if prosecuted at all, allowed to get off scot free, or with a very inadequate penalty. It is only by the strictest supervision and by invariable prosecution that such nefarious practices as these can be kept in check.

NOTES OF THE MONTH.

BELL TRAPS.

In a recent report to the Local Government Board, Dr. Parsons so well states the objections attaching to the bell traps favoured by ignorant and unscrupulous builders, that it may be well to reproduce his observations for the benefit of those sanitary officials who are seeking to banish so vicious and worthless a form of trap from their districts. Dr. Parsons rightly says that habit and a trifling saving of original outlay at the cost of safety, convenience, and durability, are apparently the only reasons which can be adduced for the use of the bell trap. He describes it as consisting of two separate parts; 1st, an annular cup surrounding the top of the sink-pipe, and capable of containing, in the smallest sizes, not more than two or three ounces of water, and 2nd, of a loose grating, to the under side of which is attached, usually by a narrow neck, an inverted cup or bell, which when in place covers

the aperture of the pipe, and dips at its circumference into the water contained in the annular cup. In addition to the objections that attach to all water traps without disconnection and proper ventilation of the drain, viz., that the pressure of the air in the sewer being often greater than that of the air of the house, noxious gases from the sewer are liable to pass through the water of the trap, either driven in bubbles or carried in solution, being absorbed on the side where the pressure is the greater, and given off again on that where it is less, there are special objections to the bell trap:—1st. The grating and bell being loose, can be easily taken up, and then there is no trap at all. This is commonly done to allow the waste water to escape more quickly, the water-way of the trap being very narrow. The trap in cheaply built houses is commonly made of cast iron, upon the rough surface of which grease and dirt are deposited, which soon clog it up. It is also very readily choked, and then the bell must be taken up to clear it. Careless people take up the bell to allow solid matters, as tea-leaves, to go down the drains. Whenever the bell is out of place a current of sewer air streams up into the house. Moreover, being loose, the bell is liable to be lost altogether. 2nd. The amount of water which the trap contains is very small, and the depth of water seal very trifling—in the small sizes, commonly from a quarter to half an inch; hence the trap when intact and in place offers but a very feeble barrier to the entrance of sewer air. 3rd. The bell trap is exceedingly liable to malformations and injuries of various kinds, all having the effect of establishing a direct communication between the air of the drain and that on the other side of the trap.

SALICYLIC ACID IN MILK.

Milk vendors, it is stated, are in the habit, at present, of largely adding salicylic acid to milk, for the purpose of preventing its turning off when kept. This addition has recently been prohibited in France by the Minister of Health; and M. Girard recommends the following tests for revealing the presence of salicylic acid in milk. In 100 c.c. of suspected milk place 100 c.c. of warm water and 5 drops of acetic acid. Filter to separate the casein, shake the filtered fluid with 50 c.c. of ether. Decant the ethereal layer, and evaporate it on a watch-glass. To the residue of evaporation add 1 per cent. solution of iron; the salicylic acid presents an intense violet colour.

NAPHTHA LAMPS.

The Chemical Section of the Russian Physico-Chemical Society has, on the proposal and at the expense of Mr. V. J. Ragosine, established a competition for a prize of 750 metallic roubles (3000 francs) for the invention of a lamp intended to burn the heavy oils of petroleum (naphtha), *i.e.*, the parts of the raw petroleum which distil after the kerosene or ordinary petroleum (density from 0.79 to 0.83 at 20° C.); as also astral oil (density 0.83 to 0.85 at 20° C.), but before the oils intended for greasing purposes (density about 0.88), *i.e.*, oils whose density is from 0.85 to 0.88 at 20° C. The lamps ought (1) to be as simple as possible in construction, so that they may be easily manufactured and manipulated; (2) only glasses existing already in the retail trade to be used, if they are used at all; (3) to burn, without giving either soot or smell, the heavy oils whose density is at least between 0.865 and 0.875. The lamps must be sent in by January 12th, 1882, and three specimens of each should be sent, accompanied by a detailed description in Russian, French, German, or English. There is no restriction as to nationality. Further information may be obtained from the Secretary of the Society, St. Petersburg.

ALUMINOUS DISINFECTANTS.

In a communication to the St. Petersburg Technical Society, Professor Beilstein (*Pharm. Journal*) recommends the use of sulphate of aluminium as the best practical disinfectant. He states that the best method of making the salt for disinfecting purposes is to mix red clay with 4 per cent. of sulphuric acid, and to add to the mixture some carbolic acid for destroying the smell of the matter to be disinfected. According to this authority, lime and its salts only temporarily destroy bacteria, and, under some circumstances, contribute to their development; and sulphate of iron, even in a solution of 15 per cent., does not ultimately destroy bacteria, as they revive when placed in a suitable medium.

HOTELS AND LODGING-HOUSES AT BOURNEMOUTH.

Visitors to Bournemouth will be glad to feel assured that the majority of the hotels in that agreeable sea-side resort now fulfil those conditions of the model bye-laws of the Local Government Board which relate to drainage arrangements, and which, when properly carried out, render a house absolutely safe from any possible poisoning by sewer gases within it. In July last, Dr. Nunn, the able Medical Officer of Health for the district, sent a circular letter to all the hotel-keepers, urging upon them the importance of attaining to this position of sanitary perfection. From nearly all he received favourable replies to his suggestions, and in many cases almost immediate steps were taken to carry out the necessary alterations. The sensible manner in which the majority of the proprietors of hotels in Bournemouth have adopted Dr. Nunn's suggestions, lead him to hope that the lodging-house keepers will show themselves equally alive to their own interests and to the health and comfort of the persons resorting to their establishments.

OUTBREAKS OF DIARRHŒAL DISEASE FROM EATING OF PORK.

Some very interesting facts have very recently come to light as to a number of cases of diarrhœal disease, due to the eating of pork in a particular condition of infectiveness. The results of the investigations that have been made cannot be regarded as at all final, but they are certainly of the highest interest and importance. Simultaneously with the publication of the report by Dr. Ballard on the series of cases of diarrhœal illness that occurred amongst the persons attending the sale at Welbeck Abbey last year, a report by Dr. Seaton, of Nottingham, is issued, containing particulars of a set of cases having the same features, and due to the same cause, viz., the eating of pork. It would serve no useful purpose to give a complete history of either of these outbreaks; but their main facts may be thus briefly stated. Amongst a large number of persons attending the sale of the Duke of Portland's effects at Welbeck last June, and partaking of luncheon at the place, at least seventy-two (mostly men) were attacked by an acute specific disease, characterised by a peculiar diarrhœa, and four of this number died.

Dr. Ballard was able, by a process of exclusion, to assign the cause of this outbreak to the ham eaten at the sale, and experiments on small animals with some portions of ham of the same consignment gave some very remarkable and unlooked for results. In two hams, taken indiscriminately out of the same consignment, there was found a living parasitic thing, capable of spreading by its growth and reproduction through the material in which it was found, and capable of producing disease in animals into whose system it was introduced; capable, also, of growth and reproduction within the system of these animals. Taking into consideration the fact that a number of persons who ate of ham of the same consignment suffered from disease induced by such eating, and the further fact that in the kidney of one of them large numbers of bacilli (similar to those found in the hams experimented with) were found, it appears reasonable to infer that some of the hams of that consignment were similarly affected with the parasite, and that either the parasite itself, or some virus essentially associated with it, was the active agent in the production of the diseased condition observed in the human subjects of the epidemic, and in the animals which were experimented on. The facts as to the more recent cases at Nottingham are very similar. Sixteen persons were taken ill after eating pork bought at the same time in the same shop, the symptoms bearing a striking resemblance to the Welbeck cases. Bacilli of the same kind as at Welbeck were found in the blood and viscera of the one fatal case; and the blood and juice of the lung caused severe pneumonia and death in guinea pigs and mice, the blood and exudations of which also contained the bacilli. These investigations are of the most important kind, and shed a flood of new light upon a difficult etiological problem. Doubtless their publication will set other investigators to work in the same direction, and may possibly result in the avoidance for the future of one of the many dangers that surround our food-supplies.

THE HANGING OF WALL-PAPERS.

Many people may have noticed the often-disgusting odour proceeding from the size and paste of paper-hanging, pervading an apartment for sometime after the paper has been newly-hung. M. Vallin, in the *Revue d'Hygiène*, reports an interesting case, which has induced him to make some inquiries in this matter. A lady, who, from time to time, came to town to supervise the decoration of her house, was three times successively seized with violent sickness and headache, after sleeping in a newly-papered room. M. Vallin was struck with the putrefactive odour which pervaded the atmosphere, and, after examining into the matter, came to the conclusion that it proceeded from the wall. It was found that a horrible putrefactive odour proceeded from the size-pot, with which the paper-hanger, in the next room, was continuing to hang the wall-papers, and that his size was in a state of putrefactive change. On making further inquiries, various other cases have come under his notice in which illness has palpably been produced by the use, by paper-hangers, of size and paste undergoing or speedily entering on septic change; and it is extremely desirable that this should be borne in mind, and, if necessary, a little oil of cloves, salicylic acid, or some other antiseptic agent should be added to the material which they use for this purpose, or at any rate care should be taken to avoid these disagreeable consequences of carelessness which is only too common.

VACCINATION AND SMALL-POX.

In a return recently issued by the Metropolitan Asylums Board, it appears that from the outbreak of the epidemic in 1876 to the present month, 15,171 cases of small-pox have been treated in the hospitals established by the Board, and the whole mortality of the cases being 17.6 per 1,000; the rate per 1,000 of the vaccinated was 8.8, of unvaccinated no less than 44.4 per 1,000.

THE DIFFUSIBILITY OF CARBOLIC ACID.

The *New York Tribune* has recently published an interesting account of the diffusive power of carbolic acid. In December last the inhabitants of Newark, New Jersey, perceived a marked taste of carbolic acid in the water supplied to the city from the Passaic river. Investigation showed the cause of this impregnation to be as follows: A paper mill is situated on the banks of the Third River, two miles from the point where that stream enters the Passaic River, a point two miles above the Newark water-works. The The Third River empties 2,000,000 gallons a day into the Passaic, the volume of which is 150,000,000 gallons a day. A speciality of the paper mill above mentioned is the manufacture of carbolised paper. None of this was, however, made since last June, when about 100 lb. of waste paper was left in a loft, where it remained until December. It was then removed, and it was found that all smell of carbolic acid had disappeared by the prolonged evaporation. The paper being dirty it was washed in the mill pond previous to re-working, and a few days after the impregnation of the water supplied to Newark was observed. Only about 10lb. of carbolic acid had been originally absorbed by the paper, and probably half had evaporated, so that the 5lb. or 7lb. remaining were sufficient to be sensibly diffused through 200,000,000 gallons of water, after passing along four miles of river, over several rapids and dams, through four miles of mains and seven miles of mains.

CONDEMNATION OF YOUNG VEAL.

The Commissioners of Sewers of the City of London, who are the executive body of the Metropolitan Meat Market, have given notice that, acting under the advice of the Medical Officer of Health, they have ordered their inspectors to seize, as 'unwholesome, and unfit for food of man', the carcases of calves less than three weeks old, or under 48 lbs. weight. Such a rule as this they no doubt consider desirable in the interest of the consumers, and some people could say also of the improvement of the breed of cattle in England. We cannot approve, however, of that view of the case. We are not aware what are the definite reasons why sucking-calf should be considered altogether unwholesome, while sucking-pig is held a delicacy. Doubtless, calves dropped dead, or in such a state that they will die in the course of the first or second day, are not well suited for human food; but to make such an arbitrary rule as that above referred to, is, it appears to us, both unwise and unjust. Few persons have studied this subject more than Mr. Vacher of Birkenhead. The practice in Birkenhead is, we believe, to condemn still-born calves, and those which, having only lived a few hours, are practically in the same condition as regards fitness for food. In judging, the inspector must, of course, be guided to a great extent by the appearance and contents of the alimentary canal. If this contain meconium, it is pretty strong evidence against the carcase, whereas,

if there is milk more or less digested in the stomach and small-gut and no meconium, the calf is regarded as old enough to pass. Generally speaking, forty-eight hours allows ample time for the milk to 'go through' the animal, and the carcase is then sound veal, and fit for any market. As to the weight-test, calves not unfrequently weigh 48 lbs. when dropped, but a calf being under this weight would prove neither that it was unwholesome, nor that it was under three weeks old. In an order of the kind something should be said about how the calf is to be weighed; when butchers quote a weight for a calf, they generally mean the weight of a carcase after the head and neck have been removed. We believe it will be found that an examination of the calf's feet will help us in coming to a decision. Calves dropped dead, or living but a few hours, have very soft feet. It will surely be no easy matter for the most experienced inspectors to say whether calves are just over or under three weeks old. Continental practice and theory we may add alike condemn such an order as that to which we refer.

LEGISLATION CONCERNING PLUMBING.

Senator P. C. F. Chandler stated in a recent address, delivered at the Cape Institute, New York, that there was a bill now in preparation, which was intended to provide by legislation for the plumbing of the future, by requiring that no public or private building should be erected, unless plans for the plumbing should be submitted to and approved by the Board of Health, and that there should be a registration of all plumbers, any one of whom detected in putting in imperfect work, should have his name struck off the list.

THE PUBLIC HEALTH
DURING FEBRUARY 1881.

THE mean temperature during February at the Royal Observatory, Greenwich, was 37°.7, and was 0°.8 below the average February temperature in 100 years. Last month was, moreover, the coldest February since 1875, when the mean temperature of the month was 35°.0; while in 1855 the mean temperature of February was so low as 29°.4. The mean was below the average on nineteen of the twenty-eight days last month; it ranged from 49°.7 on 3rd, to 30°.5 on 28th. Rain, or melted snow, was measured at Greenwich on eighteen days last month, to the aggregate amount of 2.4 inches, which was 0.9 above the average February rainfall in sixty-one years. The sun was above the horizon during 277.9 hours during February, but only 26.1 hours of bright sunshine were recorded; this was less than half the recorded amount of bright sunshine in February 1880, and was considerably below the amount in any corresponding month on record. The direction of the wind was very variable during the month.

In the twenty large English towns dealt with in the Registrar-General's weekly returns, containing a population of more than seven and half millions of persons, or nearly a third of the entire population of England and Wales, 22,548 births and 13,907 deaths were registered during the four weeks ending 26th February. The births were equal to an annual rate of 38.6 per 1,000 of the estimated population in the twenty towns, against 35.2, 33.8, and 36.5 in the three preceding months. The birth-rate last month was equal to 39.5 in London, while it averaged only 37.8 in the nineteen provincial towns; it ranged from 29.9 and 32.4 in Bradford and Oldham, to 42.4 and 43.6 in Wolverhampton and Hull.

The annual death-rate during the four weeks of February was equal to 23.8 per 1,000, against 20.5 and 26.2 in December and January. The average February death-rates in these twenty towns, during the three years 1878-79-80 were respectively 26.3, 26.4, and 29.1. The death-rate during last month, therefore, not only showed a marked decline from that which prevailed in January, but was considerably below the average February death-rate. It is evident that, the severe frost which prevailed from 12th to 26th January was far less fatal in its effect upon the public health than is usually the case in such periods of low temperature.

The lowest annual rate of mortality in the twenty towns last month was 18.9 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow: Leicester, 19.5; Sheffield, 19.8; Bradford, 20.8; Newcastle-upon-Tyne, 20.8; Birmingham, 21.1; Bristol, 22.5; Wolverhampton, 22.7; Hull, 22.8; Salford, 23.1; London, 23.4; Plymouth, 23.8; Brighton, 24.3; Sunderland, 24.5; Nottingham, 24.7; Norwich, 25.3; Leeds, 25.4; Oldham, 28.9; Manchester, 29.5; and, the highest rate during the month, 29.9 in Liverpool. In the provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during February averaged 24.2, while in London it was equal to 23.4. The high death-rates during last month in Oldham, Manchester, and Liverpool were mainly due to the exceptional fatality of diseases of the respiratory organs, the zymotic death-rates in these three towns scarcely showing an excess.

The 13,907 deaths from all causes in the twenty towns last month included 1,286 which were referred to the principal zymotic diseases; of these, 324 resulted from whooping-cough, 265 from scarlet fever, 207 from small-pox, 155 from measles, 141 from fever, principally enteric, 125 from diarrhœa, and 69 from diphtheria. These 1,286 deaths were equal to an annual rate of 2.2 per 1,000 in the twenty towns during the four weeks under notice, and showed a considerable decline from the zymotic rates prevailing in recent months. The death-rate from these diseases last month was equal to 2.5 per 1,000 in London, while it did not average more than 1.9 in the nineteen provincial towns; it ranged from 1.0 and 1.1 in Plymouth and Hull, to 2.7 and 2.9 in Leeds and Liverpool. The excess of zymotic fatality both in Leeds and Liverpool was mainly due to whooping-cough. The 324 deaths from whooping-cough in the twenty towns showed a decline of 53 from the number returned during January, and the fatality of this disease was considerably below the average for the season. The 265 deaths from scarlet fever were less by 136 than the number in the previous month, and the annual death-rate from the disease in the twenty towns, which had been equal to 1.07, 0.90, and 0.69 in November, December, and January, further fell to 0.45 in February. The largest proportional fatality of scarlet fever occurred last month in Oldham and Norwich; the fatal epidemic in Sunderland has almost disappeared. Measles was somewhat more fatal in London than in the provincial towns; the deaths from this disease were considerably below the average. The 141 deaths referred to fever (including typhus, enteric, and simple continued) in the twenty towns were equal to an annual rate of 0.24 per 1,000, and showed a further decline from the fever rates in recent months; the fever rate did not exceed 0.17 in

London, whereas it averaged 0.30 in the nineteen provincial towns. The 69 deaths referred to diphtheria in the twenty towns included no less than 47 in London, while but 22 occurred in the nineteen other towns; of the latter, 5 were returned in Birmingham, 4 in Portsmouth, 4 in Liverpool, and 3 in Bradford. Small-pox caused 205 more deaths in London, and 1 each in Brighton and Manchester, whereas no fatal case of this disease occurred in the other seventeen provincial towns. The prevalence of small-pox in London showed a further increase during February; and the number of small-pox patients in the Metropolitan Asylum hospitals, which had steadily increased from 105 to 520 in the three preceding months, had further increased to 752 on the 26th February. The average weekly number of new cases of small-pox admitted to these hospitals, which had been respectively 20, 53, 97, and 115 in the four preceding months, further rose to 195 during the four weeks of February. The greatest fatality of small-pox in London occurred in the East and South groups of registration districts.

The fatality of diseases of the respiratory organs showed a considerable decline from that prevailing during January. The average weekly number of deaths referred to these diseases in London, which were 369, 316, and 513 respectively in November, December, and January, declined again to 436 during February, and were 79 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London, which had been equal to 4.3 and 7.2 per 1,000 in December and January, declined again to 6.1 in February. The death-rate from lung diseases last month was equal to 10.5 in Liverpool and 7.4 in Salford.

In the outer ring of suburban districts around London, having a population of little less than a million persons, the annual death-rate from all causes during February did not exceed 17.4 per 1,000, against 15.5 and 18.9 in the two preceding months. The zymotic death-rate in suburban London was only equal to 1.3 per 1,000, against 1.6 and 1.8 in December and January. The death-rates from all causes and from the principal zymotic diseases in inner or registration London during last month were, as before stated, 23.4 and 2.5 per 1,000 respectively, showing fully the usual excess compared with the rates in the suburban districts.

SPECIAL REPORTS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

MRS. JOHNSTONE ON PREVENTIVE DISINFECTION.

A MEETING of this Society was held on Friday, February 18th, Dr. Bristowe, President, in the chair. A letter was read from Mrs. Johnstone, Manager of the Hastings and St. Leonards Sanitary Aid Association, offering to come to London and superintend the carrying out of the same plan of nursing, including disinfection, in cases of infectious diseases as had been so successfully carried out at Hastings and St. Leonards. She stated, as the result of her experience, that when skilled frained nurses and visitors followed the Medical Officer of Health they often persuaded persons to adopt precautions which would otherwise have been neglected, and that epidemics of infectious diseases had often been cut short. (See SANITARY RECORD, June 15th, 1880.) Referred to the Council. A letter was also read from Dr. B. W. Richardson, suggesting the appointment of a Committee to co-operate with Professor Gladstone and himself on the subject of the prevention of the spread of infectious diseases by means of the School Board schools. After discussion the matter was referred to the Council, to confer with Drs. Gladstone and Richardson. A letter was read from the Sanitary Institute, asking the Society to make an exchange of publications. Agreed to. Dr. Billings, Surgeon-General, Washington, U.S., was balloted for, and unanimously elected an Honorary Member.

MR. SHIRLEY MURPHY ON THE SMALL-POX EPIDEMIC AND THE MODE OF DEALING WITH IT: DISCUSSION.

Mr. SHIRLEY MURPHY then read his paper on the 'Causes of the Present Diffusion of Small-Pox, and the means which should be adopted for its prevention.' He began by saying that his was not an elaborate paper, but was to be looked upon as consisting of a few practical points on the subject. He thought it a matter for regret that Medical Officers of Health were practically prevented from overlooking the vaccination of the inhabitants of their districts, especially as in London, from the fluctuating character of the population, the large number of children born in public institutions, most of whom escaped vaccination, and other causes, there must always be a considerable number of unvaccinated persons. That, from the comparative laxity of the older Vaccination Acts, a large number of the elder children and adults are not vaccinated, so that we must wait until the young children have grown up before this proportion of unvaccinated persons will be much reduced, unless adult vaccination and revaccination be more generally adopted. He thought that vaccination should not be under the direction of the Guardians, but under the control of Medical Officers of Health, as the Vaccination Officer at present is not under any supervision except that of his own Board. He pointed out that the Public Vaccinator is paid the full fee for primary vaccinations only, and not anything for re-vaccination under 14 years of age, however badly the original vaccination might have been performed; and that there is no power to enforce the re-vaccination of persons in houses in which small-pox has appeared. He then stated his opinion that the removal of the sick is not an unmixed good, as it affords the means of providing, during an illness arising from neglect, board, lodging, and medical attendance at the expense of the community, and this indirectly encourages persons to remain unvaccinated. Still, he considered that the sick should be isolated, as the disease is most infectious, rapidly affecting persons in the same ward if introduced into a general hospital. He did not propose to enter into the question of danger from small-pox hospitals, but thought that the words 'proper lodging and accommodation' should be interpreted in a different sense as regards small-pox cases to other diseases, and therefore almost all cases should be removed to hospitals. As to the duties of Medical Officers of Health during small-pox epidemics, he thought they could scarcely be defined, but considered that he should inspect the arms of children at school and in the houses of the sick; and that he should be empowered to perform vaccination. He thought they had little power to check the disease when it had once become decidedly prevalent.

Dr. DUDFIELD considered that some means should be taken to procure an additional supply of lymph, which was difficult at all times to obtain, especially during epidemics. He also thought that a more liberal supply of lymph should be furnished by public vaccinators to the Local Government Board. He referred to the subject of hospital accommodation, and said that much excitement prevailed in his district respecting the Fulham Hospital, and believed that much good would result from a compulsory notification of infectious diseases.—Dr. R. CORY, the Public Vaccinator at the principal station, said that vaccination should be performed at non-epidemic times, as it is impossible to supply the demand for lymph during epidemic periods, although lymph will keep a year in hermetically sealed tubes. In answer to a question, he explained the method of sealing tubes.—Dr. TRIPE said that in his district many medical men did not re-vaccinate those living in houses where the disease occurred, and several instances had occurred of children remaining un-vaccinated in the same house, and even family, with others affected with small-pox. He also complained of medical men sending away patients in the early stage of the disease to relatives or friends residing at a distance, without advising any precautions to be taken. He referred to the great mortality from small-pox during the last ten years in the streets adjacent to the Small-Pox Hospital at Homerton.—Dr. GWYNN gave similar statistics as regards the Hampstead Hospital.—Dr. RADCLIFFE differed with Dr. Gwynn as to the cause of the outbreak at Hampstead in 1871.—Dr. BUCHANAN, Medical Officer to the Local Government Board, said that vaccine lymph cannot be produced wholesale, and that medical men should re-vaccinate at non-epidemic periods, when there would be a sufficient supply for all ordinary requirements, and that even now lymph can be obtained from the public vaccinators by special arrangement. As regards London, he agreed with Mr. Murphy that there is greater difficulty in obtaining a proper percentage of vaccination owing largely to the great number of newly-born who escape vaccination in workhouses and hospitals. He thought re-vaccination required greater support from the medical profession, as protection against small-pox undoubtedly decreases after puberty. He dwelt especially upon the rarity of small-pox after proper re-vaccination.—Dr. SWEETING agreed with Dr. Buchanan as to the necessity for re-vaccination, and the comparative rarity of its performance.—Mr. CORNER supported the compulsory notification of infectious diseases.—Mr. HILL referred to the mortality from small-pox in the vicinity of the Hampstead Hospital, but Dr. BRISTOWE objected that his statistics were not admissible, as they were drawn from too small a population. He thought there is some *primâ facie* evidence that small-pox hospitals are injurious, but he did not think they are necessarily so. He thought a Medical Officer of Health could not draw a fair opinion on the subject, as there are many influences at work outside his district concerning which he had no information, and therefore applauded the appointment of Local Government Board Inspectors to make these enquiries. He also strongly supported re-vaccination at puberty. The meeting then adjourned.

The *Revue Scientifique* of February 26, contains an abstract of the report issued by M. Durand-Claye, on the disinfection of sewage. He has visited Berlin, Danzig, and Breslau, and gives a full description of the system employed in each place.

MR. ERNEST TURNER, F.R.I.B.A., ON THE SANITARY WORK OF AN ARCHITECT.

Mr. ERNEST TURNER, in commencing his paper, read before the Architectural Association, on Feb. 4th, stated that his present object was to call the attention of the younger members of the profession to the importance of the subject of sanitary science, to its bearings upon the profession, to the interest it possesses, to its many branches, and to a few general principles and practical points, so as to lead them to a more careful study of the subject. Mr. Turner referred to the strictures of the general public on the knowledge possessed by architects upon sanitary subjects; and confessed that there was a certain section of men who raved about high art in inflated language, and completely neglected such matters as ventilation, drainage, and sanitary appliances in the buildings they designed. Again, there were others who were far behind the times in their specifications; but, on the other hand, there were many who had quietly and unostentatiously laboured in the field of sanitary science, and whose labours, though comparatively unappreciated, had been productive of much good to the community. He then referred to the Registrar-General's returns as showing the large annual mortality from preventable disease; the inquiries made under the direction of the Medical Officers of the Privy Council showed that large reductions in the mortality, especially from fever and lung diseases, had followed the completion of sanitary works in various towns selected for inquiry.

In planning a new building the question of aspect was one of the first for the architect to consider. Preference was expressed for a south aspect, as being the more cheerful and warmer of the two. In this country we should court light and sunshine, and should not forget that they are important agents in developing the human frame and maintaining health. As a striking example of wrong-headedness in placing and planning a building, mention was made of the Royal Victoria Hospital at Netley, which is built on a shallow bed of gravel, overlying clay, and the wards of which all face north-east. Moreover, there is no proper ventilation of the soil-pipes of the building.

In the choice of site for a dwelling-house, clay and alluvial soils were to be avoided as damp and unwholesome. Gravel is preferred by many, but the bed of it must be deep: nothing being worse than a shallow bed of gravel, with a subsoil of clay. Made soils, consisting of deposits of all sorts of rubbish and decaying vegetable matter, were to be avoided as dangerous. Soil is an air-carrier, as well as a water-carrier, and the air of houses being warmer than the external air, sewer gas, and other gaseous matters, are liable to be drawn from the earth into dwellings. It is a good rule always to have (as recommended by the Local Government Board) the whole ground-surface properly asphalted, or covered with a layer of good cement concrete, rammed solid, at least six inches thick.

The beneficial influence produced upon health by a dry subsoil is well established, and the level of the ground water deserves much more attention than has hitherto been given to it. When the level of the ground water is high, the soil above is made cold and damp; and colds, rheumatism, and consumption are the diseases that result from it. Very great diminution of the death-rate from consumption has been proved by Dr. Buchanan to have followed the lowering of the ground water by drainage of towns. The

drainage of the site should be effected by land drains, care being taken that the outfall is not in any way connected with the soil drains or sewer. If properly executed, it is surprising how far the influence of these drains will extend.

Perhaps in the majority of cases in an architect's practice no necessity arises for subsoil drainage; but there are few cases where a good layer of concrete over the whole of the building area will not be advantageous. The value of a free circulation of air between this layer and the floor above cannot be over-estimated. Most houses are now built with a damp-proof course and air bricks; but too frequently, and especially in the country, these are not placed high enough, and in a short time the paths and flower-beds are raised, and both air-bricks and damp-proof course fail to serve the purpose for which they were intended. Houses built, as most English houses are, of brick, would be much healthier, inasmuch as drier and warmer, if all external walls were built hollow. Architects, indeed, generally agree on this point, though comparatively few houses are built in the manner recommended.

As to soil drains, there are unfortunately numerous cases on record which show that architects standing well in the profession have neglected the drainage of their buildings. For an instance of this the new Government Offices recently erected at a very large expense in Whitehall were pointed out. Daily experience shows that more attention to this subject is required of architects. If the drawings of the many beautiful buildings that have been erected during the last ten years were overhauled, the contrast between the elaboration of the details of the decorative work, and the meagreness of the few red or blue lines usually found on the ground or site plan to indicate the course of the drains, would doubtless be only too apparent.

In draining a building the chief points to keep in mind are that the drain pipes used should be of good quality; that the drains should be laid in straight lines with no right-angled junctions; that when bends are required bent pipes should be used; that the pipes are no larger than necessary; that they are laid on a solid foundation to a regular and sufficient fall; that where cement is used, hard ridges should not be left at the joints; and that the levels of the pipes, and their water-tight qualities, should be tested before they are covered in. The thorough inspection of the whole of the pipes after they are laid is very important, but is too often neglected or improperly delegated to unqualified persons.

In every well-planned system of drainage the entire length of the sewers and its branches should be easily accessible by means of man-holes (as in Fitzroy House, belonging to the Home Hospitals Association); so that in case of necessity a brush can be passed from end to end without disturbing the floor.

The practice of making drains as large as possible, instead of as small as may be necessary for efficient working, was next referred to at length, and shown to be contrary to all right principles. The smaller the pipe the less is the friction; the greater the hydraulic pressure the greater the velocity, and consequently the less chance of any obstruction taking place. To carry off a small quantity of water quickly a small pipe must be used, for the greater the proportion of the wetted perimeter to the volume of water to be discharged the greater the resistance. (By wetted perimeter is meant that portion of the drain actually in contact with the water.) If a pipe becomes choked, it is generally owing to its being too large, not too small, or to faulty laying or construction.

Next in importance to having good pipes properly laid and jointed—Stanford's joints being recommended—is the necessity of disconnection and ventilation, with the object of preventing sewer air from passing into the building. There are still comparatively few houses where these essentials to a healthy home exist. A siphon trap should be fixed at the most convenient place between the building and the sewer; the water standing in the trap presenting a barrier to the passage of sewer air. Immediately above this trap, on the side between it and the building, there should be an open drain for a length of from two to four feet, according to circumstances. The soil-pipe should be carried well above the roof, and left open at the top. By this means there would be at all times a current of fresh air passing through the entire length of the drain and soil-pipe.

Waste-pipes should also be disconnected from the drain by contriving so that there is a free current of air between the end of the waste-pipe and the water-seal. The most important of these is the overflow pipe from the cistern, which, until recently, was invariably connected with the drain or with the D-trap under the closet. D-traps and bell-traps were condemned, S-traps and P-traps being described as the simplest and best. Messrs. Doulton's cheap gully-trap (see page 335) was pointed out by the lecturer as being one of the best traps to receive the discharge from waste-pipes, whilst acting at the same time for surface drainage.

The various forms of apparatus used for water-closets were next discussed and their several deficiencies pointed out. The pan closet was unreservedly condemned, and a hope was expressed that its use would, in due course, be absolutely forbidden. Preference was expressed for wash-out valve-closets if properly constructed and trapped, and well supplied with water. Trapless closets were also referred to, together with the Vortex, the Carmichael, Bostel's, and Mr. White's new 'wash-out' closets. However good the apparatus might be, it was of course essential to obtain a good flush of water, and every flush should be sufficient to carry away the contents of the pan through the drain and into the sewer. Water-closets should be always against an outer wall; and in hospitals and similar buildings there should be a ventilated lobby between the main building and the closet.

Finally, Mr. Turner touched briefly upon the great importance of ventilation. He expressed his fear that architects had been too much on the look out for some single appliance to answer all purposes; but this might be searched for in vain. Ventilation means the admission of a sufficient quantity of fresh, and the extraction or expulsion of a corresponding amount of vitiated air without sensible draught, so that both inlets and outlets are required. Warming is part of and cannot be separated from the art of ventilation. Other matters connected with it are the size of rooms—especially of bed-rooms, the height of rooms, the amount of window-space, and the height of windows.

It has been resolved to form a society at Sheffield for the preservation of commons and footpaths, under the title of the Sheffield and District Commons and Footpaths Association.

MR. E. C. ROBINS ON VENTILATION, LIGHTING AND WARMING.

In connection with the course of lectures on dwelling-houses, which is now being given at the Parkes Museum of Hygiene, Mr. Edward C. Robins lectured Jan. 8, on 'Ventilation, Lighting, and Warming'. Mr. Robins recommended the study of the works of reference in the Museum library, particularly the works of the late Dr. Parkes. The principles which should be carried out in providing for the ventilation of dwellings were explained, and illustrated by the many kinds of apparatus exhibited in the Museum, such as the Arnot and Sheringham valves, Verity's water-power ventilator, the Currall ventilator, and the Architrave ventilator, an adaptation of the Currall patent (all of which are fully described and figured in Mr. Easie's 'Dictionary of Sanitary Appliances', now being published in our columns). The system known as 'Tobin's' was shown to have been introduced a hundred years ago by Mr. Whitehurst of Oxford. Lighting and warming were considered as part of the subject of ventilation. To light or warm properly, it was necessary to provide for the exit of the products of combustion. Benham's and Faraday's ventilating gas-lights were explained and commended, and in connection with oil lamps, the Libra lamp (Hopkinson's patent) was shown. The Libra lamp, it was said, would burn for upwards of eighty hours without any attention after lighting. Several old and new stoves were shown and described.

THE METEOROLOGICAL SOCIETY.

The usual monthly meeting of this Society was held on Wednesday, 16th ult., at the Institution of Civil Engineers, Mr. G. J. Symons, F.R.S., President, in the Chair. J. L. Bell, F.R.S.; J. Bernays; A. W. Blyth; J. Church; F. W. Cory; S. Cutler; D. L. K. Edge; C. Horsley; W. T. Howard; C. Kelly, M.D.; G. Lingwood; W. Macgeorge; Captain J. P. Maclear, R.N.; A. Rigg; and H. C. Stephens, were elected Fellows of this Society.

The following papers were read: 'Relative Humidity', by Charles Greaves, M. Inst. C. E., F.G.S. The object of this paper was to show that the term 'Relative Humidity' was frequently the cause of misunderstanding, and that it was desirable that some other tables, with a more correct denomination, should be used, in order that reliable values of this factor in our climate should be recorded.

'On the Frost of January 1881, over the British Isles', by William Marriott, F.M.S. The author pointed out that the severe frost of the 7th to the 26th, was remarkable for its unexpected appearance, its long continuance, and its sudden breaking up. The weather during the first week of January was comparatively mild, but frost set in over the north of Scotland on the 5th. The author then gave the lowest thermometrical readings from about 300 stations in the United Kingdom, for each day of the frost, which were plotted upon diagrams, clearly showing the relative severity of the weather experienced in each district. The lowest readings were 15° at Garstang on the 16th, 22° at Blackadder, 16° at Kelso, 15° at Stobo, 11° at Thirlestane Castle, and 10° at Melrose, on the 17th. Reference was also made in detail to the rivers and lakes which had been frozen over, and to other winter incidents proving the remarkably low temperatures which had occurred. Some idea of the intensity of the frost may be gathered by the fact that in the South of Scotland the temperature fell below 10° on more than eleven occasions, below 20° on nineteen occasions, and was below 32° on twenty-five to twenty-nine occasions. In the London district, readings below 10° occurred on two or three days, below 20° on ten days, and below 32° on twenty days. In Ireland, temperatures below 10° were registered on six or seven occasions, below 20° on twelve or fourteen occasions, and below 32° on twenty-two to twenty-four occasions. No place in the British Isles was exempt from the frost, even at Scilly the temperature was below 32° on three days, the lowest being 29° on two occasions. The winter seaside health-resorts afforded no protection from the frost; at Penzance the temperature fell below 32° on ten occasions, at Torquay on eleven occasions, and was below 20° on six occasions; at Ventnor it was below 32° on nineteen occasions, and below 20° on three occasions; and at Bournemouth it was below 32° on twenty-three, and below 20° on ten occasions. The heavy falls of snow prevented the frost from penetrating far into the ground, but where the snow was cleared away, the temperature of the soil fell considerably. A diagram was exhibited, showing the mean temperature of January in the neighbourhood of London for each year, from 1774-1881, from which it appeared that the low mean temperature of 31°6 for last month had only been surpassed on five occasions, and that the three years (1879-81) have been very cold, the mean for this period being only 32.°2; there is no instance during the past 100 years of any three consecutive Januaries having so low a mean temperature.

EXHIBITION OF GAS-COOKING AND HEATING APPLIANCES AT DOVER.

An exhibition instituted by the Gas Company of this town, showing the uses to which gas could be applied, was opened in the Wellington Hall, Snargate Street, on the 1st inst., and closed on the evening of the 5th. The exhibition of cooking and heating stoves was mainly confined to four firms; and information has reached us from others firms that they received no intimation whatever of the intention of the Gas Company to hold an exhibition. If the company, however, failed to draw a large number of manufacturers together, they may be complimented on the manner in which they carried out the details, and in their courtesy to the exhibitors and the visitors. The admission to the hall was free; the greater part of the viands cooked were supplied by them, and a table was laid, whereon was placed the provisions so prepared, and any visitor was at liberty to partake of a substantial meal gratis. The principal exhibitors were Messrs. John Wright and Co., London and Birmingham, Messrs. H. and C. Davis and Co., Camberwell, Mr. Billings, High Holborn, and Messrs. West Bros., of the Delph Works, Battersea. Each of these firms sent an excellent assortment of their leading articles for cooking, bread and pastry baking, general work, etc. Heating stoves of various characters were also exhibited, but we missed the important firm of Leoni, whose generally extensive display of the higher class of gas apparatuses go far to make up an exhibition of themselves. A few of the inventions of Mr. Fletcher of Warrington, including his *petite* instantaneous water-heaters, small, solid, flame-boiling stoves, and one moderate-sized cooker, were exhibited by the Gas Company themselves; so also were the heating, lighting, and ventilating stoves of

Messrs. Ritchie and Co., St. Swithin's Lane. Of gas-burners, globes, etc., there was practically but one display, that of Mr. Sugg of Westminster; but if deficient in the number of makers, this want was made up for, to some extent, in attractiveness, Mr. Sugg's collection being both extensive and meritorious.

An attractive exhibit of gas-meters, gauges, instruments, etc., was sent by Messrs. W. and B. Cowen of London, Edinburgh, and Glasgow; but there was not a single example of a gas-engine; none of the gas-regulators, that are now becoming so popular, nor of many other little appliances we have seen at former exhibitions.

Of baths heated by gas there was but one, shown by Messrs. John Wright and Co., and this we consider most unfortunate. These appliances are, for the moment, under a cloud, owing to certain unfortunate circumstances that have recently happened in connection with their use, and which, if not speedily and satisfactorily explained, will operate very prejudicially against their more general adoption.

On the whole, from a pecuniary point of view, the Dover exhibition may be pronounced as having been successful, and we hope we shall see more of these instructive collections in the southern and western portions of the kingdom.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

KENSINGTON.—Dr. Dudfield's report for the year 1879, which gives the ordinary sanitary statistics for the parochial year ending March 1880, is an interesting and exhaustive document. From this report it appears that of the population of 156,250 of which Kensington consists, 2,991 persons died, a mortality of 19.1 per 1,000 persons living. Dr. Dudfield deals at length with the charges against the Fulham Small-pox Hospital, and as small-pox hospitals are just now under discussion, and the question is one of great public importance, we give Dr. Dudfield's views in his own words:—'The hospital stands in its own grounds of some six acres. It consists of ten pavilions, with accommodation for 250 patients. Each bed has an allowance of 144 square feet of floor space, and each patient an air space of 2,100 cubic feet. Every ward is well warmed and ventilated, being lighted with numerous opposite windows. The officers are housed in a separate "administrative" block of permanent construction. The site is bounded north and south, respectively, by the Lillie Bridge and the Stamford Bridge Running Grounds; on the west by a large open space in Fulham, and on the east by the West London Railway and the Brompton Cemetery. The grounds, attractively laid out, are enclosed by efficient fences, and many trees have been planted within them. The nearest inhabited houses in Fulham are about 150 yards from the hospital; and the nearest houses in Kensington nearly double this distance.

'Now, if a hospital isolated, constructed, and well ordered as this one admittedly is, could be proved to be dangerous to the people in its vicinity, an important question would practically be settled: there ought to be no hospitals for infectious diseases within the metropolis!

'It is remarkable that persons who take this view, who regard the hospital as a common danger, and would close it forthwith, yet do not appear to regard as anything very serious the risk of keeping small-pox patients at home, in rooms that are small and unventilated, in houses that are tenanted by numerous families, and under conditions which would neutralise the best attempts at isolation, but where, practically, no such attempts are seriously made. In such circumstances patients are kept at home, and it has been my lot to see disease spread from family to family without direct contact between the sick and well. How, indeed, could it be otherwise? If the "infectious particles" can be carried by the air hundreds of yards from the hospital as alleged, *a fortiori*: they can be carried from one room to another by the air in the common stair-case; and from house to house, from street to street. And if nurses, visitors, etc., may convey the disease from the hospital as stated, notwithstanding all the precautions taken to avoid the spread of infection, how much greater must be the danger arising from those who, after contact with the sick, without bathing and without change of clothing, or other precautions, mix with their fellows in the outside world? Many a case is kept at home simply because the attack is slight; and medical advice is not sought lest the removal of the patient should be enforced: scarcely any precautions are deemed necessary. The man who does not feel ill will not readily submit to enforced idleness, which means starvation for his family; while the convalescent child, in such circumstances, thought to need fresh air, is turned out to get it in the streets. Rarely does it happen that home-patients are isolated for the requisite length of time, varying, we are told, from three weeks to as many months, until the scabs and scales have fallen off; and as a rule they have not facilities for bathing and skin disinfection. Necessary precautions—disinfection of the sick chamber, of the excreta, and of drains, etc., destruction of dust and *débris* of food—are for the most part not taken: they are either impracticable, not understood, or disregarded, and especially in the most perilous of all cases—the mild and the concealed. The alleged dangers of the public hospital are multiplied indefinitely in these private hospitals; and when we take into consideration the number of them (and probably concealed cases are as numerous as those which are disclosed) the marvel is not that the disease in epidemic times is so rife, but that so many people escape.

'Small-pox is intensely contagious. A competent authority has lately said of it that, "the isolation and the general precautions which are sufficient in the other infectious diseases are insufficient in this one. . . It attacks at once all susceptible persons immediately on their exposure to it. . .When it strikes it strikes at once. . .In an ordinary pavilion-hospital fevers may be treated in pavilions situated side by side, with a laundry in common. The blankets, bedding, and linen of these different fevers may be used with impunity for either fever indifferently after being washed, but the same cannot be said of clothing which has been used for small-pox . . . because small-pox, when treated in the same conditions as the other contagious diseases, spreads, whilst these do not. If, for instance, one case of small-pox arise in an hospital, or by mistake be admitted into one, more are sure to follow, and that not necessarily in the ward in which the first case appeared, or into which it had been admitted, but in the different and widely separated parts of a large building. Thus, if the first case appear in the extreme east, the second may appear in the extreme west, or possibly somewhere between

these two points. Or if the first case appear at the top of the house the second may appear at the bottom, and so on, . .and this occurs when patients have not left their wards or even their beds. . .The precautions, then, which are sufficient for the other contagious diseases are not sufficient for this one." Now, if this be so, can any one doubt that each case improperly retained at home is a danger to the public health? The danger would be well-nigh illimitable but for the protection afforded by vaccination and re-vaccination. In many and varied ways we have seen, and shall see, the disease may be spread, but the opponents of the hospital speak and write as if *it* was almost the only—and certainly they regard it as the chief—source of infection. Their contention, moreover, is practically that the "concentrated poison", the "palpable small-pox particles", are diffused by the wind. Now, simply noticing, in passing, the obvious consideration that the wind often blows in one direction for many days, and that long continuance of the wind in one quarter has been coincident with a subsequent outbreak of small-pox around the hospital at all quarters of the compass—for the intensity of the epidemic has risen and fallen in contiguous parishes and in the metropolis simultaneously—I pass on to deal with the assertion that small-pox particles may be carried, as they would in this case have to be carried, hundreds of yards, and still retain their infective power. Such an assertion is contrary to medical experience, and it is not shared by any important section of the profession. The allegation, however, can be most effectually met by a counter-statement of a fact which I quote from Dr. Collie's paper before alluded to. He says:—"The Infirmary of the City of London Union at Homerton stands at a distance of ninety-nine feet from the westmost block of the Homerton Fever Hospital, and in this block, upon two occasions, for a period of four months each, there were forty small-pox beds constantly occupied. The windows directly face each other, and are almost always open. Here, then, apparently, are the conditions for the passage of small-pox poison if it be true that it may be carried long distances through the air. Amongst a number of persons, consisting of children, new-born infants, and young women in confinement, there were likely to have been some susceptible subjects. The poison was there, and not only in the block referred to, but in certain winds it would be blown from three similar blocks which are parallel to it. Thus air liable to contamination by about 250 small-pox patients might on two different occasions, for a period of about four months, have passed into rooms inhabited by persons, some of whom were probably susceptible to its influence, and yet on neither of these occasions did a single case of small-pox arise in the Union Infirmary. . .It is on this account that I have come to the conclusion", says Dr. Collie, "that 100 feet would be a safe distance for the separation space between a hospital and the nearest inhabited houses". In the face of facts like these, how can it be contended that streets at 1000 feet distance have been again and again directly infected by "poison" emanating from Fulham hospital?'

SALFORD.—Dr. Tatham is to be congratulated on the excellence of his report for 1879. The delay in its appearance is unfortunate, for reports published so long after the periods to which they relate are apt to lose their interest and freshness. Dr. Tatham has on this occasion remodelled his report on the basis of the recently issued instructions of the Local Government Board, so that he treats under different heads of the influences injuriously affecting the public health of Salford, the causes and origin of disease, the action taken for the repression of disease, the causes influencing the spread of infection, and his advice to the Sanitary Committee. The details given of the work of the sanitary department show that the borough is well looked after in this respect. No less than 24,883 inspections were made during the year, and 4,700 separate sanitary works were carried out by property owners. The common lodging-houses, slaughter-houses, cowsheds, and offensive trade establishments were kept under vigorous supervision, and Dr. Tatham reports with regard to the latter a creditable desire on the part of the proprietors to give as little trouble as possible. In 1879 there were 7,240 births and 4,495 deaths in the borough, equal to rates of 40.1 and 24.9 per 1,000. The death-rate was the lowest on record, the average for the least fifteen years having been 27.5. The deaths of 1,230 infants under one year (or 27.4 per cent. of the total mortality) were registered, whilst there were 2,215 deaths (or 49.3 per cent.) amongst children under five years. Zymotic diseases caused 893 deaths, equal to a rate of 4.9 per 1,000. Small-pox was absent from the borough, but scarlatina was very prevalent, causing 203 deaths, against 145, the corrected annual average. In connection with the prevalence of this disease, Dr. Tatham deplores the want of early information as to infectious cases, and urges upon the Town Council the importance of making the giving of this information compulsory within the borough. Measles was fatal in 193 instances, whooping-cough in 144, and diphtheria in 24. Fevers are decreasing in Salford, though Dr. Tatham has to confess that typhoid fever is still endemic there. To typhus fever four deaths were referred; but these were sporadic cases, and were imported from outside. Typhoid caused 52 deaths, and simple continued fever six more. Owing to the cold and damp summer, diarrhœa was much less fatal than usual, 141 deaths being referred to it as against an average of 320. An ingeniously conceived diagram shows the facts of the diarrhœa mortality, and the concurrent meteorological phenomena, in a very graphic and striking form.

LAW REPORTS.

EXPOSING INFECTED CLOTHING.

Ellen Allen was charged, on the information of Mr. W. R. Bunce, of Theale, Inspector of Nuisances for the Bradfield Rural Sanitary district, with having unlawfully exposed clothing which had been infected with scarlet fever, without having previously had the clothes disinfected. Defendant pleaded 'Guilty'.

Dr. Woodford, Medical Officer of Health for the district, gave evidence that defendant came home some weeks since after suffering from scarlet fever. The fever spread to her family. They were provided with a trained nurse, and were repeatedly visited by Dr. Woodford himself and the Inspector. On almost every occasion of his visit the doctor warned the defendant of the danger of allowing her infected clothing to be publicly exposed until it had been disinfected. The particular offence complained of was that the defendant left the house and went to an inn on the day in question wearing clothing which had not been disinfected. The defendant was fined £1 9s. 6d. including costs.

BREAKING INTO A SEWER.

Henry Bentley, of Battersea, was summoned at the Wandsworth Police Court, at the instance of the Wandsworth Board of Works, for making an opening into a sewer in Lebanon-gardens, West Hill, Wandsworth, without consent being obtained in writing. The defendant said he did not know that any notice was required. Mr. Sheil, the magistrate, pointed out to him that he had rendered himself liable to a penalty of £50. Mr. Corsellis, the Clerk of the Board, said that the connections were made surreptitiously for the purpose of avoiding payment of the charge. He pressed for a penalty, as the opening to the sewer was deliberately made. Mr. Sheil fined the defendant £5, with 2s. costs.

PROSECUTION UNDER THE NEW GLASGOW MILK SHOP REGULATIONS.

This is the first case which has been brought under the notice of the Glasgow Court by the Sanitary Authorities since the new regulations were issued by the Lord Provost and Magistrates for the management of milk shops. The charge was laid against Andrew Hunter, milk dealer, and was to the effect that he carried on the business of milk dealer, the shop being in communication with a kitchen, a back bedroom, and a front parlour, all of which is in contravention of the regulations which prohibit the selling of milk in premises that are in direct communication with sleeping apartments.

Evidence was led by sanitary authorities, after which Sheriff Balfour delivered judgment, remarking that the prosecution was laid under the Contagious Diseases (Animals) Act, on the ground that defendant kept a milk shop in contravention of the regulations made under the Act, a shop which was in direct communication with a dwelling-house and sleeping apartments, and on that account the respondent was liable to a penalty of £20. In the early part of last year the Privy Council issued an order dealing with the matter; but it was found to be of so general a nature that it could not be well enforced. The Local Authority, therefore, made other regulations, and by one section it was provided 'that no milk shop or premises where milk is kept, stored, or exposed for sale shall be used as a dwelling-house or sleeping apartment,' or be in direct communication with a dwelling-house or sleeping apartment. It was proved in evidence that there was direct communication from the shop to the rooms, in which there were beds; and not only direct, but actual communication. As it was the first case of the kind which had been brought, and was intended chiefly as a warning to others, he imposed a fine of £5 only.

OFFENCES UNDER THE SMOKE NUISANCE ACT.

Messrs. Joseph Causton and Co., wholesale stationers and printers, Southwark Street, Borough, have been summoned before Mr. Slade, by order of the Home Secretary, under the Smoke Nuisance Act, for using two furnaces in the factory so constructed as not to consume the smoke. Mr. William Sanderson, C.E., the Government inspecting engineer under the Smoke Nuisance Act, said that he visited the defendants' premises, and found two furnaces in full work constructed to consume the smoke, but out of repair. There were also two other furnaces in action not constructed to consume the smoke, and the latter two emitted from the shaft a dense black volume. Inferior fuel was being used, which made it worse. He called the attention of the manager to it, and he promised to have the machinery put in proper order. He understood that the furnaces were being altered. —Mr. Slade ordered the defendants to pay a fine of £3, and £1 13s. 6d. costs.

Henry Becker, baker, Earl Street, Borough, was also summoned before Mr. Bridge, by authority of the Home Secretary, for a breach of the Smoke Nuisance Act, for using a furnace so constructed as not to consume its own smoke. Mr. Bridge fined him £3 and £1 3s. costs.

RESPONSIBILITY FOR DRAINAGE EXPENSES.

Gould and Others, Appellants: the Bacup Local Board, Respondents.

This was a case stated by Justices in a cause arising at Bacup, Lancashire, raising a question as to the right of the Local Board of Health to levy as a debt the sum incurred as the expense of making sewers they considered necessary for the proper drainage of a property. The appellants are owners as trustees of certain houses on one side of a street at Bacup, as to which the Board thought it necessary that there should be new branch drains or sewers connecting the house drains with the main sewer. The notice was originally given under the Public Health Act, 1848 (11 and 12 Vict., cap. 63) to the then owner, and the work not being done by him was done by the Board in his lifetime. There was a second notice as to expenses necessarily incurred after his death, as to which the notice was given to his trustees and executors, and they not doing the work it was done by the Local Board, and they sought to recover the entire expense from the trustees, treating the whole as one entire amount. Their right to recover it was disputed, as the first notice stated that the expense would be treated as 'private improvement expenses', the effect of which would be that a rate would be levied on the houses, spreading over some period not exceeding 30 years, and payable by the occupiers, they deducting three-fourths from the rent; and, further, it was contended that the amount did not constitute a debt recoverable summarily, but only a charge on the property, leviable by means of a rate. The magistrates made an order, but stated a case for the opinion of this Court.

Mr. Cave, Q.C., argued for the trustees that the Board had in their original notice exercised their option to treat it as a debt leviable by rate, and could not now trea tit as a debt, especially against subsequent owners, not owners when most of the work was done.

Mr. Edward Clarke, Q.C., argued for the Board in support of the claim to recover the whole against the trustees, and urged that they were not so far bound by the terms of their notice as to be precluded from recovering the expenses as a debt against the present legal owners, the trustees, or of compelling them to levy it by a rate, that being only a power given to them in the Act.

Mr. Justice Manisty, in giving judgment in favour of the appellants, the trustees, said the Board had in their notices stated that they should treat the expenses as 'private improvement expenses', and they were bound by that notice. They had by the Act an alternative, either to treat the expenses as a debt summarily recoverable from the owner, or to treat it as a sum to be levied by a rate upon the occupier in respect of a 'private improvement' expense, the sum being leviable, at the rate of 5 per cent., over a period, it might be, of 30 years, three-fourths being deducted from the rent. This was an advantage to the owner,

and an advantage of which he could not be arbitrarily deprived. That seemed to be the fair result of the Act.

Mr. Justice Stephen pointed out that the notice stated that the Board would, if they had to execute the work, treat the expenses as 'private improvement expenses'. That was done under the two Acts of 1848 and 1875, and it was a declaration of intention which, after it had been acted upon, could not be revoked. Judgment was therefore for the trustees, the appellants, with costs.

THE ARTIZANS' DWELLINGS ACT.

The Metropolitan Board of Works v. *Windus and Collins.*

This was an appeal by the Metropolitan Board of Works against an award by Mr. Hunter Rodwell, Q.C., M.P., on the ground that the amount was excessive. The property was in Walworth Street, Whitechapel, a wretched locality. It consisted of a public house, the Cross Keys, and the other property was let out in weekly tenements, and described as the scene of 'Nancy' in one of Dickens's novels ('Oliver Twist'). The tenements were in a condemned area, and had been taken by order of the late Home Secretary under the Artizans' Dwellings Act. The evidence of the surveyors, as usual in compensation cases, was very conflicting. The highest value on the part of the claimants was £6,649, and the highest value on the part of the Board £3,348, while for the public house the difference was more remarkable: the Board's estimate was £2,517, and on the part of the claimants £4,193.

Mr. Under-Sheriff Burchell succinctly placed the case before the jury, explaining the nature of the Artisans' Dwellings Act. In all cases where the award exceeded £500, either side could appeal to a jury, and the losing side was allowed £20 for costs; and if the sum awarded exceeded the award, the other side had to pay all costs. He also remarked on the remarkably different estimates of valuation.

The jury gave a verdict for £4,250. It was then stated that the award of Mr. Rodwell was for £5,700.

Hawksley v. *Bradshaw.*

Mr. Mellor, Q.C., said that after consultation with counsel on the other side, he was happy to say the jury would not be troubled with the case. The plaintiff, Mr. Hawksley, the eminent civil engineer, brought the action against the defendants for a libel published in the *Nottingham Journal*, imputing to Mr. Hawksley that, for the sake of his commission, he had induced the Nottingham Waterworks Company to execute works which were not necessary. No one could for a moment believe that his clients, the defendants, meant to make such an imputation upon him, and they positively and unreservedly, through him, denied any intention on their part to do so. Mr. Hawksley occupied a deservedly high and honourable position, and was quite incapable of such conduct, and therefore it would be satisfactory to his Lordship and the jury to know that with this explanation, and an expression of regret by his clients at what had occurred, it had been agreed upon terms to withdraw the record.

Mr. Murphy, Q.C., who represented the plaintiff, said that Mr. Hawksley only brought the action to vindicate his honour against charges which he and his friends felt could not be disregarded. It could not be expected that a gentleman who had passed so long and distinguished a career as Mr. Hawksley, would allow aspersions of this kind to be cast upon him publicly, but his sole object was to protect himself from them, and he accepted the explanation and apology which had been offered.

Mr. Justice Hawkins said that, although he could well understand that the defendants never had the smallest intention to impute anything dishonourable to Mr. Hawksley, yet he could also well believe that Mr. Hawksley was very jealous of even a breath of suspicion being cast upon him. His Lordship added that he thought the parties had come to a very proper arrangement. Mr. Hawksley's character had been amply vindicated, and the defendants had done that which was right in the circumstances.

MILK DANGERS.

At the Reigate County Bench, a farmer named Collier was summoned for having retained a cowman, milking cows, when the man's son lay ill with diphtheria, of which he subsequently died. The milk was supplied as usual to consumers.

Mr. Jacob, the Medical Officer of Health, said that he called upon the cowman, and found his son in contact with the rest of the family, and paralysed with the effects of the disease. He warned the cowman to desist from milking. The Chairman fined the defendant £5 and costs, and added that the bench considered that the sanitary officer should have been more prompt in giving notice to the police. Both the medical and sanitary officers denied their liability to give such notice. The Chairman, however, considered that the Sanitary Officer's duty had been performed in a very perfunctory manner, the prosecution having been instituted at the instance of the police authorities.

BRIEF NOTES OF USEFUL CASES.

NUISANCE.

1879. *Malton Urban S.A.* v. *Malton Farmers Manure Co.* "Public Health Act, 1875," s. 114—Held that effluvia proved to interfere with the comfort and enjoyment of inhabitants is a "nuisance" within this section, and moreover "injurious to health" within this section — Per Stephen, J.:— It is not necessary in order to bring a nuisance within this section to prove injury to health—*G. W. R.* v. *Bishop* considered. (49 L.J., M.C., 90; L.R., 4 Ex., 302; 40 L.T., 755; 44 J.P., 155.)

ELECTION OF LOCAL BOARD.

1880. *Reg.* v. *Gaskarth.* "Public Health Act, 1875," Sched. II, Rule 64—Annual Election of Local Board — One successful candidate the lessee of Board's sewage farm—Whereupon the Returning Officer refused to declare him duly elected—Mandamus granted to Returning Officer to do so—A lessee as aforesaid is not to be deemed intended in a contract with the Board or the holder of a place of profit; on the contrary, he is within the exceptions specified in the Rule. (49 L.J., Q.B., 509; L.R., 5 Q.B.D. 321; 42 L.T., 688; 44 J.P., 507.)

RATES.

1879. *Walsall Overseers* v. *London and North-Western Railway Co.* "Public Health Acts, 1872 and 1875"; Local Acts—Exemptions from Rating conferred by a Local Act held not repealed by subsequent general Acts in the absence of express words of repeal. (48 L.J.M.C., 166; L.R., 4 App. Cas., 467; 41 L.T., 106; 43 J.P., 748.)

RATES.

1879. *Toxteth Park Overseers, In Re*—Non-payment of Rate—Refusal of justices to issue Distress Warrant, on ground that party should have opportunity of appealing—Rule *nisi* for *Mandamus* to issue Warrant, the time for appealing being shown to have lapsed. (*Times*, June 17, 1879.)

MEETINGS.

1879. *Dean, Ex parte.* Bankruptcy Rules, 1870—Four persons not having received notice, a meeting held not duly convened, although the due posting of the notices was proved. (41 L.T., 602.)

HIGHWAYS IN LOCAL BOARD DISTRICT.

1880. *Rolls* v. *St. George's, Southwark, Vestry.* "Metropolis Management Act, 1855," s. 96—Meaning of the word "vest"—A street, on becoming stopped up and disused held to revert to the owner of the land on whose property it had been made. *Coverdale* v. *Charlton* explained. (49 L.J., Ch. 691; L.R., 14 Ch. D., 785; 43 L.T., 140; 44 J. P., 680.)

ADULTERATION OF FOOD.

1880. *Horder* v. *Scott.* "Sale of Food Act, 1875," ss. 6, 12, 13—Although an Inspector employs a deputy to purchase samples for him and does not do it himself directly, yet the Inspector may in his own name summon the vendor. (49 L.J., Q.B. 78; L.R. 5 Q.B.D., 552; 42 L.T., 660; 44 J.P., 520.)

BUILDING LINE.

1879. *Poplar B.W.* v. *North Metropolitan Tramways Co.* "Metropolis Management Amendment Act, 1862," s. 75—It is an offence to encroach on the building line of a street, even although the street may not have been completely dedicated as a public highway. (Metrop.) (43 J.P., 590.)

PETROLEUM.

1879. *Coleman* v. *Goldsmith.* "Petroleum Act, 1871," s. —Person licensed to sell petroleum at his house—Also a licensed hawker—As such he took out vessels, each holding 10 gallons of petroleum, and retailed it in small quantities—Held that he was properly convicted of unlawfully keeping petroleum in contravention of the Act. (43 J.P., 718.)

RATES.

1880. *Reg.* v. *Surrey J. J.* Next practicable Sessions where only a part of a day was available to consider the advisability of an appeal, held that Sessions on the very next day could not be deemed the "next" practicable Sessions—Computation of time. (50 L.J., M.C., 10; L.R., 6 Q.B-D., 100; 43 L.T., 500; 45 J.P., 93.)

CLERK.

1879. *Nevington L. B.* v. *Eldridge.* Defendant a solicitor and late Clerk to Local Board—Defendant being dismissed, refused to deliver up various papers, claiming a lien on them in respect of an unpaid Bill of Costs—Held that the Board should pay into Court £1000, which done, defendant was to have the same lien on the money as upon the papers, but that the latter must be delivered up to plaintiffs. (L.R., 12 Ch. D., 349.)

INTEREST OF JUSTICES.

1879. *Reg.* v. *Huntingdon J. J.* "Dogs Act, 1871"—Three Justices, members of a Town Council, having assisted in making an order, afterwards sat to hear a complaint of non-observance of the order—Held that they had no such interest as to oust their jurisdiction. (L.R., 4 Q.B.D., 522; 43 J.P., 767.)

REVIEWS.

Beitrage zur Hygiene. By Dr. FLÜGGE. Leipsig: Veit and Co.

This is a typical German work, combining the most exact and pains-taking details with an entire want of grasp of the subject. The book is divided into four parts:—Temperature of dwellings (Wohnungsklima) in the height of summer; Porosity of the soil; Pollution of the soil of towns; and Food in Public Institutions.

In the first article, the author gives the results of his investigations into the temperature of artizan dwellings in summer; he remarks wisely, that unhealthy dwellings and insanitary conditions lower health, and render the inhabitants more subject to disease; these causes work slowly and inobtrusively, and do not, therefore, receive the attention accorded to outbreaks of epidemics. Dr. R. Flügge considers that the health of the artizan class is much injured by sleeping in a high temperature, which must limit the heat given off by the body; this high temperature, he holds, is in great measure due to the heat of the walls, which give out by night the heat which, during the day, they have derived from the rays of the sun. Dr. Flügge conducted his experiments on the temperature of walls in a thickly peopled quarter of Berlin; they are amply described, and are extensively supplemented by tables. Every three hours, from August 4, to September 3, day and night, Dr. Flügge gives a record of the temperatures of the interiors of the different walls and stories of the house, and the corresponding temperatures of the outer air. These temperatures were ascertained by means of thermometers, fixed three centimètres deep in the wall; he found that the wall receiving the morning sun from 7 o'clock to 1, reached its maximum temperature at 3 p.m., and the wall receiving the sun from 1 to 7 p.m., at about 9 p.m.; the walls that were in shadow, or which faced the north, varied very little in temperature. The walls were fifty centimètres in thickness, but the author does not say of what material they were composed. Dr. Flügge suggests remedies, the best of which is that walls should be hollow, which would limit their conducting power; he also recommends that the width of the streets should be limited, as he complains that excessively wide streets are always accessible to the rays of the sun; this, at any rate, will be a new light to English sanitarians, who have no difficulty in keeping the rays of the sun from their dwellings.

The author's researches into ventilation were carried on in the same part of Berlin as his other experiments; from these he ascertained that each inhabitant obtained by night, on the average, five cubic mètres of fresh air per hour; this calculation is of course based on the fact, that in Germany open windows by night are unknown, as are open fireplaces, on which (unless stopped up) so much of English bed-room ventilation depends. Very ample tables are given, and numerous figures are cited, to prove the proverbial fact of the very small amount of fresh air that finds its way into German houses; but the author devotes one short sentence only to the question of remedying the evil, viz.: that 'continually acting, and suitably situated, larger openings' should be provided.

The second article begins with a reference to the author's tests of drinking-water, in which he maintains that the nature of the drinking-water has no reference to the different outbreaks of typhoid (Ger-

man, typhus) fever; the water, he says, is influenced by the physical peculiarities of the soil from which it is derived, and the properties of the soil (as indicated by the testing of the water) are of far more sanitary importance than the drinking water itself. The author does not, apparently, discriminate between typhus and typhoid; 'typhus abdominale' is the term generally used by German writers, when describing typhoid.

The main part of this article is devoted to the description of different methods for ascertaining the porosity of the soil, after which it comes to an abrupt conclusion, the author promising to communicate at some future time the results of his further researches.

In the third article, the author apparently considers that too much stress is laid, in these days, on the pollution of the soil of towns; he asserts that it is made answerable for all outbreaks of typhoid ('typhus'), and charges English medical officers of health in particular, with tracing all outbreaks of typhoid to nuisances such as offensive privies, ditches, etc., in those cases in which the drinking-water does not contain an improper amount of organic matter. Dr. Flügge forgets that in various mysterious outbreaks of typhoid, English officers of health have not contented themselves with the discovery of a foul ditch or drain, but have not rested till the outbreak has been traced to its true source, such as infected milk, etc., etc. The author insists that we cannot form a true opinion of the diminution of typhoid through draining of towns, because the statistics of typhoid are gathered from the mortality, which the writer holds is now much diminished by improved medical treatment. Dr. Flügge, however, allows that there may be a certain etiological connection between pollution of soil and infectious diseases, but considers that this connection has not, hitherto, been proved; he also observes that the variation (bewegung) of typhoid mortality does not correspond with the pollution of water, but shows opposite fluctuations. These remarks are supplemented by tables of experiments made in different parts of Berlin, and by assertions which vary widely from what is generally believed in this country. The germ theory is barely mentioned.

The last article, 'Diet in public institutions', is far the best in the book; in it the author gives the results of a number of experiments made on himself and others; from these he infers that the distastefulness of food has no effect on its power of nourishing the body; day after day he took the same quantity and kind of food, and found, on the fourteenth day of his experiment, that the food, though then loathsome to him, nourished his body as well as on the first day. He then proceeds to analyse the diet of Prussian prisons, and of the army in time of peace, and he shows that the amount of albumen present in the food is greatly in excess of the amount digested, from which he infers that in establishing a diet, due consideration is not given to the digestibility of the albumen provided. Tables are given, which show that this indigestible albumen is found entirely in vegetable foods. In comparing the quantity of meat eaten daily in different places, the amount ranges from 79 grammes per head in Saxony, to 274 grammes per head in London; in Saxony, the people live almost entirely on vegetable food, and have mostly poor constitutions, and but little bodily power. Minute details of personal experiments, and analyses of food in various public institutions, form the main part of this article.

Facts about Fevers; or Practical Rules for Preventing the Spread of Infection. By DAVID PAGE, M.D. Edinburgh: Maclachlan and Stewart; London: Simpkin and Marshall.

THE diseases treated of in this pamphlet are Scarlet Fever, Diphtheria, Typhoid Fever, and Small-pox. The principal headings under which the subject is worked out are (1) How to prevent infection; (2) How long will the infection last? (3) How long will the disease be in showing itself in a person who has been exposed to the risk of infection? (4) How soon may a person who has been exposed to the risk of infection be pronounced safe? (5) How infection leaves the body of the sick; (6) How infection is spread; and (7) The best methods of disinfection. In addition to these, there are also two short chapters on household rules for the prevention of infection, and on points to be attended to in house-drainage and water-supply. The information given under each of these headings is conveyed in plain language, and is sufficient to enable anyone to form an opinion on these matters, and to take such measures as the nature of the case may require, both for the proper management of the sick room, and the prevention of the spread of infection to healthy persons. We can therefore recommend its perusal to all who are interested in these subjects.

Tuberculosis from a Sanitary and Pathological point of view. By GEORGE FLEMING, F.R.C.V.S. Messrs. Baillière, Tindall, and Cox.

THIS is a paper read before the Norfolk and Eastern Counties Veterinary Medical Association, which the author has been well advised in issuing as a pamphlet. Mr. Fleming has done so much for veterinary medicine, and is such an honest observer, that anything he writes on animal diseases is sure to be worth reading, and the subject of the *brochure* before us is one on which he has bestowed special attention. Long before Villemin demonstrated the inoculability of tuberculosis, Mr. Fleming suspected its contagiousness, and half-a-dozen years ago he showed what very strong evidence there was in support of the transmissibility of the malady. He now takes up the topic from the time when it first became an object of special study, and gives a *résumé* of the principal experiments made with tuberculous matter, flesh, and milk, besides an estimate of the proportion of animals affected. His proofs are more than sufficient and bear out his contentions, which may be summed up as follows:—1. That bovine tuberculosis affects a large proportion of the bovine population, and is a continually extending disease. 2. That it is almost certainly infectious from animal to animal. 3. That tuberculous matter inoculated or ingested, will produce the disease in healthy animals. 4. That diseased flesh, and the milk of cows affected, will, when taken as food, produce the disease in healthy animals. Mr. Fleming also suggests the probability that infantile diarrhœa, scrofula, and tuberculosis may, to some extent, be due to the subjects being fed with raw milk from tuberculous cows, but the evidence he cites in favour of this view is not very convincing. We quote it in full so that our readers can judge for themselves:—

'A German, Doctor Stang, of Amborach, has given an instance of a child five years old, who had been allowed to consume, for a somewhat long period, the uncooked milk of a tuberculous cow, and who died from tuberculosis. Klencke, in 1846, gave another instance of death from scrofula, which was probably

due to this cause. A very recent case has been communicated to me. A surgeon in Providence, United States of America, had a cow affected with tuberculosis, the milk of which was consumed by his family, a large portion being allowed to one of his young children. The veterinary surgeon called in to attend the animal, warned the owner as to the danger of giving this cow's milk as food: but the warning was unheeded. The latest intelligence is that the child which received the largest share had died of tubercular meningitis.' (Page 38.)

However, our author does not claim to have proved the transmissibility of bovine tuberculosis to the human subject; he rests content with warning the public that such a thing is probable, and in so far he does well. What Mr. Fleming does insist on here, as he has done so ably elsewhere, is that the existence of such a widespread disease demands prompt measures being taken for its repression; and he has at least made out a case for tuberculosis being brought under legislative control. If cattle yielding milk were regularly inspected, and those found affected neither bred from nor housed with healthy cattle, the spread of even so insidious a disease as tuberculosis might be arrested.

SANITARY INVENTIONS.

COAL FIRE-GRATES.

THE WHARNCLIFFE VENTILATING GRATES—THE HOLBORN SLOW COMBUSTION GRATES.

The improvements in coal fire-grates that have become apparent during the last few years mainly received their impetus at the time when coal rose so extraordinarily in price, and when manufacturers turned their attention to the introduction of grates that would project more into the room, with the view of preventing the escape of so much heat up the chimney. Then followed the various slow-combustion stoves, with which we are now familiar, all tending to the reduction of smoke. These efforts have been partially arrested by a change of fashion, evinced in the return to the decoration of the Queen Anne period, and notwithstanding that makers of the more economical grates have introduced designs in their productions in consonance with the style in vogue in the 'good Queen's' reign, grates of the most extravagant character as regards the burning of fuel and emission of smoke have been placed on the market, and have found a ready sale. But notwithstanding this to be regretted change, the economical feature has not been lost sight of, and the tendency of the age is evidently to introduce smoke-consuming grates. Amongst the class we first alluded to, may be mentioned the 'Wharncliffe Patent' Ventilating and Coal Economising Grate, manufactured by Messrs. Steel and Garland, of 45, Holborn Viaduct and Wharncliffe Works, Sheffield. The method of ventilating a room and supplying warmed fresh air through a stove has universally been acknowledged to be a very perfect one, and this grate seems to be very powerful in heating as well as in ventilating. The amount of warm air heated by the grate can be regulated as desired by two gratings at the bottom of the side jambs, and by a valve along the top of the curtain. The cold air is brought from the external wall, in which is placed an air grating, and conducted to the back of the grate, which has a series of gills, through which the cold air circulates and is warmed by the fire-basket, which forms the one side of the air chamber, and is then distributed through the gratings and valves in the grate into the room. Our illustration shows the grate made on the slow combustion principle, but it can be made with an open bottom if desired. The grate is made to pro-

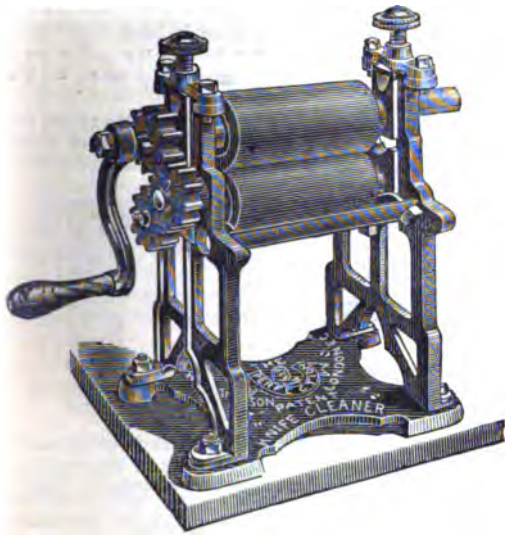
ject into the room, so that none of the heat escapes up the chimney, as in most cases where the fire is recessed; the sides and back of the fire basket are made of solid fire-brick, as well as the bottom, and there is an ash-pan on a level with the bottom bar to receive the very small amount of ashes and dust made by the fuel consumed. When anthracite coal is used in this grate it is almost 'smokeless', and when used with a mixture of bituminous and anthracite coal it has been found to produce a very cheerful fire, lasting a considerable length of time without attention.

The Holborn Slow Combustion Grate is another excellent stove, made by the same firm, but totally different in appearance. It has all the artistic appearance of the modern style of grate, and is fitted with 'Stephens' Patent Body', which radiates the heat and enables the chimney to be cleaned with greater facility than ordinary register stoves. The fire-basket of this grate is also solid fire-brick as well as the bottom, and the general appearance is very pleasing, as it combines the old style with modern improvements, and has the advantage of possessing all the latest improvements in the economy of fuel.

A NEW SYSTEM OF KNIFE CLEANING.

Nearly three years since, Messrs. Hodd & Son, of the Minerva Works, Hatton Garden, introduced a new and simple system of cleaning knives, which is fast becoming popular, and promises to secure for itself a permanent footing in the household. At the Royal Agricultural Society's show at Kilburn, in July 1879, Messrs. Hodd & Son's machines, worked by boys who had never before seen them, cleaned the whole of the knives used in the principal refreshment department day by day, amounting to many thousands, and gained a most gratifying testimonial from Messrs. Roberts, the contractors, as to the excellent manner in which the work was done. The first machine patented by the firm was named the 'Lady Help'; this was followed by a second called the 'Despatch', having one or two little improvements, and recently a 'trio' has been completed by the introduction of a third, which they have christened the 'Per-

fection', and of which we append an engraving. The main principle is the same in all three, that is to say, the knives are cleaned by passing them through two rollers, though there are small differences in detail in each. Taking the one we illustrate as an example, we may say that it occupies a space of only about 7½ inches square, and is screwed on to the dresser or



any convenient place in the kitchen. The frame is of iron, and the rollers are of the best vulcanised india-rubber, underneath them being a shallow trough in which the knife-cleaning powder is placed. This is caught up by the bottom roller in its revolutions and carried back to the top one in a similar manner. The knife is placed between the rollers, the handle is turned, and with a few revolutions, and drawing the knife backwards and forwards during the operation, it is effectively cleaned. The rollers are regulated by a screw at each end, but they do not touch each other, so that there is an entire absence of friction between them. The important points claimed for Messrs. Hodd and Son's system is that it does not wear away the knives, that the machine itself is almost indestructible, that it is much lower in price than a *good* rotary machine, and that it will, although cleaning only one knife at a time, do its work as rapidly, and that it is free from the constant expense entailed by using the rotary machine. One striking feature in this system we have yet to name. It is well known that apart from the rapid wearing away of knives cleaned by the rotary machine, they have a dead bright appearance, which is not the most pleasing to the eye. In the 'Perfection' and its sister machines, after a few cleanings, a brilliant polish is put upon them which is permanent, and gives them a very close resemblance in colour to silver. An instance is known to us in which the machine has been in use for three years; has cost nothing for repair, and is practically as good as the first day it was made; while the knives cleaned by it are scarcely reduced in size, though in daily wear.

SAPO CARBONIS DETERGENS.

Messrs. Wright's coal-tar soap is one of the most valuable soaps ever introduced for use in the nursery and for toilet purposes. It has great sanitary advantages, being well charged with an antiseptic solution of a bland unirritating character. The most eminent dermatologists agree in praising its value in skin-affections, in which it is both healing and comforting. It has an old and well-established reputation, which is as well maintained as at the date that this excellent soap was first introduced, and manufactured by W. V. Wright and Co., 42, Southwark Street.

The liquor carbonis (alcoholic solution of coal-tar) is extensively used in the sick-chamber, and, as a surgical application, it has great deodorising power as well as valuable antiseptic qualities, and is extensively used by medical men with excellent effect.

SPENCER'S GYMNASTIC APPARATUS.

Messrs. Spencer, of 52, Goswell Road, gymnastic apparatus manufacturers, have forwarded us their illustrated catalogue, in which is figured a comprehensive assortment of every description of gymnastic appliances. As the physical education of the youth of both sexes is now recognised to be of paramount importance, the more especially in large towns where out-door pastimes are not easily attainable, every inducement should be given for the erection and use of these appliances, which tend so much to develop the frame and increase the stamina of our youthful population. Messrs. Spencer are patronised by Government, the London School Board, and other large institutions, and we recommend the inspection of their catalogue to all interested in this branch of hygiene.

MESSRS. GROOM AND CO.'S HYGIENIC SPONGE-BATH.

The luxury of cold sponging and the healthful tone imparted by it to the system would not be readily dispensed with by those who are accustomed to it; yet this form of bathing has always had its drawbacks to persons of delicate constitution, owing to the necessity of having to stand in cold water during the operation, a practice generally condemned by the profession. To obviate the objection many amateur devices have been adopted, but no special appliance to overcome the objection noted appeared until Messrs. Groom and Co. introduced, a few months since, their 'well and dry platform sponge-bath'. Our illustration

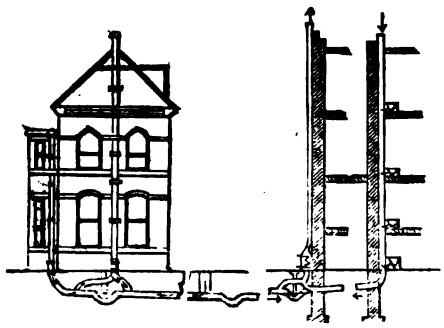
shows the arrangement. Nearly two-thirds of the bath are covered with a platform, on which the bather stands; the remaining portion forming a well or receptacle for the water. By this means, economy in time and water is secured; and, in winter, a small quantity of hot water poured over the platform will keep the feet warm during the time of bathing.

The success that has attended the introduction of this bath is a convincing proof that such an invention was required, and we are informed that it has

been taken into use by many members of the medical profession, who approve of the principle upon which it is constructed.

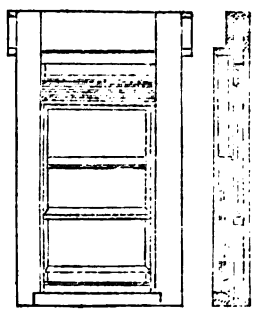
ILLUSTRATED SANITARY PATENTS.

2854. EXTRACTING SEWER-GAS FROM DRAINS: B. MORTON, SALFORD, LANC. [6d.]—The air is rarefied in a chamber connected by a flue or pipe to the drain, and heated by a coil of pipes supplied with exhaust steam. The rarefaction draws the foul air or gas from, and fresh air into, the drain. A pipe or flue carries off the foul air.



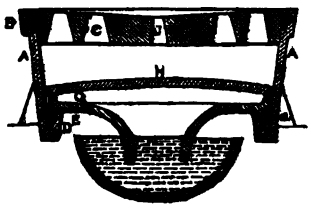
Branch pipes are applied to the sides of the ordinary syphon-traps, one pipe being connected to the main drain and to the ascending pipe, which leads to the heated air-chamber; the other branch-pipe is connected to the soil-pipe. Instead of heating the chamber by steam, gas or hot air might be used. (July 10, 1880.)

2872. WINDOW-FRAMES AND SASHES: W. WILSON, LIVERPOOL. [4d.]—Consists in adding to the top of a window-sash a ventilator, composed preferably of louvres, and of forming in the reveal of the window-frame a chamber



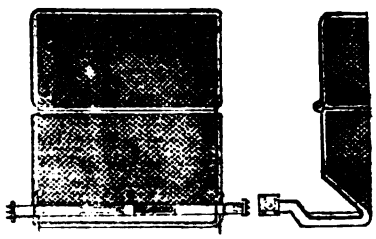
for the louvres to slide into. A rack and pawl, or similar contrivance, can be attached to the sash and frame, to fix the sash at any desired position for uncovering one or more of the louvres. (July 12, 1880.)

2933. TRAPPED-GULLIES, OR GRATINGS FOR STABLES, ETC.: C. W. BURGE, LONDON. [6d.]—Consists essentially (1) in the construction of a water-tight joint around



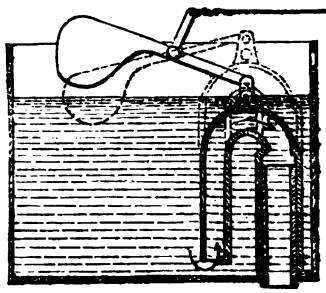
a removable trap, which, with the addition of a rim or head, assists in securing an air-tight joint independently of the water contained in the groove itself; and (2) in the peculiar shape of the trap itself, as possessing an extra large water-way, the curved bottom giving a tendency to flush itself clear of all matters deposited by the sewage in its passage down through the trap. The invention is clearly shown in the illustration. The outer case, A, has a rebate, B, to receive the grid cover, C. A recessed groove, D, at the bottom receives a tongue formed round the lower edge of the trap, E. A rim or bead, G, leaves a space, *a*, between it and the casing, A; this space becomes filled with sediment, and forms an air-tight joint, independently of the water contained in the groove, D; H, is a convex strainer; J, a keyway for lifting the grid cover, C. (July 16, 1880.)

2934. SAFETY-GUARDS FOR WINDOW-CLEANING, ETC.: T. ROCHFORD, LONDON. [6d.]—Consists of a metal frame of tubing, the bottom of which is cranked to rest on



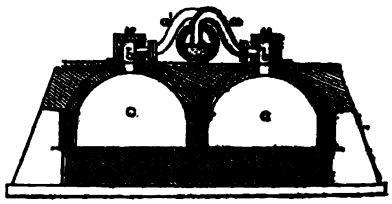
the window-sill, and is provided with two spiked surfaces, which can be forced into the woodwork of the window by screws. Several modifications are described. (July 16, 1880.)

2954. APPARATUS FOR PREVENTING WASTE OF WATER IN WATER-CLOSETS, ETC.: A. COLE, NORWOOD, SURREY. [4d.]—Consists in the application of a syphon which has its bend capable of being raised or lowered above or below the level of the water in the cistern. One leg of the syphon works by a sliding water-tight joint over a vertical pipe fixed to the bottom of the cistern, and communicating with the water-closet. The other, or shorter leg of the syphon, is immersed in the water in the cistern. A lever



and counterbalance weight keep the bend of the syphon normally above the surface of the water. This lever can be operated by hand, so as to depress the bend of the syphon beneath the water, when the syphon being thereby charged the water will flow through the vertical pipe into the pipe communicating with the closet. (July 17, 1880.)

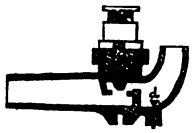
3110. ABATING SMOKE, ETC.: H. WALKER, MONKWOOD, DERBYSHIRE. [6d.]—This is practically an im-



provement in coke-ovens, the object being to abate the black smoke, and collect and condense to a large extent the

volatile products given off, and to utilise the combustible gases for generating steam, or for heating or illuminating purposes. When the gases cannot be so utilised they are disposed of by being burned without generating dark smoke. The invention is especially applicable to existing coke-ovens, and consists in arranging in the lengthway of the ovens a sufficiently large pipe, *a*, which is partially filled with water; and in connecting the outlet, *b*, from each oven by a branch-pipe, a^1, with the pipe *a*, the end of which branch-pipe descends below the surface of the water. The products of combustion and distillation pass from the oven, *c*, into the main pipe, *a*, first descending into and then rising through the water, leaving the tar and other matters in the water. The upper part of the main conveys the gases to the place where they are to be utilised or destroyed. (July 29, 1880.)

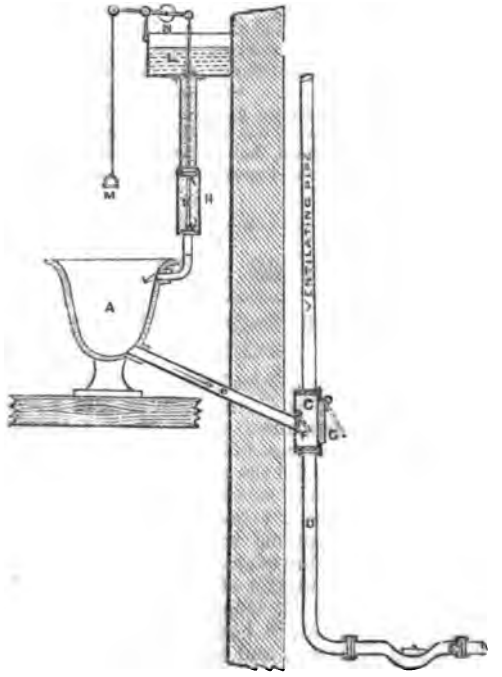
2404. WATER-TAP: C. BURGESS, SMALL HEATH, BIRMINGHAM. [4d.]—Consists of a valve which can be attached to any ordinary water-tap, and being placed in the earth below the point to which the frost usually extends is used for the purpose of allowing the water which is in the service-pipe above the tap, when the tap is closed, to run away into the ground, so that the household pipes cannot



be choked by ice; *a* is the stop-valve shown, raised from its seat, and, *d*, the escape-valve shown upon its seat. When the main valve is closed by a rod reaching up to the ground-level, the escape-valve is raised by a finger (not shown) which forces it from its seat. (June 14, 1880.)

2137. APPARATUS FOR THE PURIFICATION OR FILTRATION OF WATER, SEWAGE, ETC.: G. BISCHOF, LONDON. [4d.]—(*Disclaimer and memorandum of alteration.*) In the Specification dated May 29, 1880, there are four 'claims' relating to spongy-iron filters. These are disclaimed, and the one 'claim' now made stands thus. 'The use in filter-beds of a layer of filtering material composed of spongy iron so mixed with gravel or similar matter of a nature hereinbefore explained, that the deposit of the whole, or nearly the whole, of the ferric hydrate is effected in the filter containing the spongy iron itself substantially as herein described', disclaims and alters the specification in respect to the wording. (January 20, 1881.)

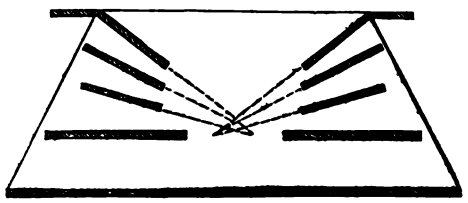
FLUSHING AND TRAPPING FOR WATER-CLOSETS.—The object of this invention is to construct water-closets in such manner that the excrement may be readily and effectually washed away with one flushing, and the discharge-pipe 'trapped' or closed; A is the basin having a discharge-pipe, B, terminating within the box or chamber, C, in communication with the soil-pipe, D, and sewer-pipe, E. At the end of the discharge-pipe, B, is hinged a lid or valve, F, which opens readily when the basin is flushed, and closes again when the flush ceases, thereby acting as a trap and preventing return gases. The box or chamber, C, is provided with a door, G, so that the pipes may be cleansed with little trouble as often as necessary; H, is the flushing-cylinder provided with an inlet-valve, I, and outlet-valve, J, both attached to the rod, K, and L is a cistern containing water for flushing purposes. The action of the apparatus is as follows: When the handle, M, is pulled downwards, the rod, K, is raised and the inlet-valve, I, is closed, and the outlet-valve, J, is opened, thereby allowing the water contained in the cylinder, H, to escape and flow into the basin, sending the excrement down the pipe, B, into the chamber, C. When the handle, M, is released, the rod, K, drops, aided by the weight, N, and the position of the valves are reversed, the outlet closed and the inlet open, whereby the cylinder, H, is again filled for another operation, and so on. By this arrangement of mechanism the basin is cleansed at one flushing, and all excrement is washed far away; the shape of the basin does not admit of any matter lying in the bottom, and the valve,



F, is especially useful for preventing gases from returning up the discharge-pipe.

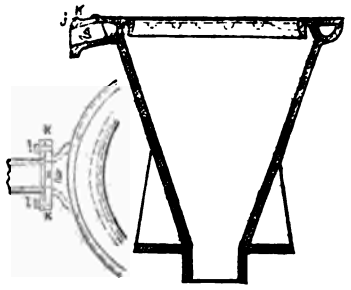
AMERICAN PATENTS.

235,303. SIDE-WALL VENTILATOR: WILLARD H. SMITH, BROOKLYN, N.Y. Filed Oct. 22, 1880. (No model.) Issued Dec. 7, 1880.—*Claim* 1. In a side-wall



ventilator, the combination, with inclined deflecting-plates, of an outer longitudinal air passage or channel extending from end to end of the ventilator, and separated from the deflecting-plates by a wall provided with a central opening, through which the air-currents are directed by the deflecting-plates into said channel, substantially as hereinbefore set forth.

235,134. WATER-CLOSET BASIN: JOHN DEMAREST, NEW YORK. Filed Oct. 4, 1880. (No model.) Issued



Dec. 7, 1880.—*Claim* 1. The water-closet basin having a water-way around the upper part and opening in the inner

wall at or near the top, in combination with the annular hanging flange within the top of the basin, substantially as set forth. 2. The combination, in a water-closet basin, of an annular water-way around the top of the basin, having holes near the top part of the inner wall, a hanging-flange, and deflectors between the flange and the basin, substantially as set forth. 3. In a water-closet basin having an annular water-way, the pipe, *g*, flange *h*, and conical seat, *i*, projecting at one side of the water-way, in combination with the clamping-plate *k*, bolts *l*, and soft-metal supply-pipe, the end of which is passed over the seat *i*, as set forth.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held on Friday, March 18th, at 7.30 P.M. The Council will present a report on—1. A communication from Mrs. Johnstone, Manager of the Hastings and St. Leonard's Sanitary Aid Association. 2. On the prevention of the spread of infectious diseases by means of the children attending the School Board schools. Dr. Dudfield will make some observations with respect to—1. The compulsory notification of cases of infectious diseases. 2. A proposed amendment of the 26th section of the Sanitary Act, 1866. 3. Depauperisation by means of medical relief, etc., in hospitals for the treatment of infectious diseases; and will move a resolution. Dr. Tripe will draw attention to the present position of affairs as regards the metropolitan hospitals for infectious diseases, and will propose that action be taken thereon if deemed necessary. Mr. C. O. Baylis will give a short account of 'A Sudden Extension of Scarlet Fever in Bromley U. S. District'. A paper will be read from Dr. R. H. Bakewell, of Hokitika, New Zealand, entitled 'Some Colonial Sanitary Lessons'.

THE LONDON INTERNATIONAL MEDICAL AND SANITARY EXHIBITION, 1881.

This Exhibition, which has now been definitely entered upon by the Committee of the Parkes Museum of Hygiene, will be held at South Kensington from July 16th, to August 13th, inclusive; Her Majesty's Commissioners of 1851 having granted space for it in their Exhibition buildings. The Medical Congress, which holds its seventh session in London in August this year, has given its cordial support to the undertaking, but the Exhibition Committee have decided not to make any appeal to the medical profession to join in the Guarantee Fund, on account of the heavy expenses which the members of the profession must incur in connection with the Congress. All others who are interested in the progress of medical and sanitary science will be appealed to to subscribe to the Guarantee Fund, of which the first list, amounting to £655, has just been published. At a meeting of the Exhibition Committee on Wednesday, January 19th, the classification was decided upon as follows:—

Medical Section.—1. Surgical Instruments and Apparatus. 2. Appliances of the Ward and Sick Room. 3. Drugs, Disinfectants, Medical Dietetic Articles, and Mineral Waters. 4. Electrical Instruments and Appliances. 5. Microscopes and other Optical Apparatus. 6. Apparatus of other kinds used in the Investigation of Disease. 7. Appliances used for the treatment of Sick and Wounded during War. 8. Appliances used in teaching Medicine; Books, Diagrams, Models, etc.

Sanitary Section.—1. Domestic and Hospital Architecture. 2. Planning and Construction. 3. Ventilation, Lighting, and Warming.. 4. Water-Closets, Sinks, and Baths. 5. Sewerage and Drainage. 6. Water-Supply and Filtration. 7. Health Resorts and Sanataria; Books and Diagrams. 8. Miscellaneous.

All enquiries and communications respecting the Exhibition should be addressed to the Secretary, Mr. Mark H. Judge, Parkes Museum of Hygiene, University College, Gower Street.

NATIONAL HEALTH SOCIETY.

At the general meeting of the National Health Society, held in the Society's rooms, 44, Berners Street, the report of the year's work was read, and considered highly satisfactory. It was proposed by George Godwin, Esq., F.R.S., and seconded by Dr. Robert Farquharson, M.P., that the report be received and adopted.

Mr. George Godwin, in addressing the meeting, said that he considered a vast amount of useful work had been accomplished by the Society with the very small amount of money subscribed.

Mr. A. Long stated that the papers published by the Society had been translated by him into Spanish, Hebrew, and Bulgarian, and sent to the East for the use of school teachers; and votes of thanks were accorded to the Chairman, Mr. Ernest Hart, the Hon. Treasurer, and the gentlemen who had so generously given their services as lecturers during the past year.

At the usual fortnightly meeting of the National Health Society, the Secretary reported that Dr. Siemens had consented to give a lecture for the Society on 'stoves and grates' in May; also that Mrs. Buckton (late of Leeds) would lecture for the Society in the spring. A Sub-Committee for the removal of dust was appointed; all information on the subject was to be obtained from Paris, Edinburgh, and Brussels. Noble Smith, Esq., was appointed Honorary Secretary for this branch of the Society's work. Mr. J. Campbell of the Kensington Vestry, and Mr. Edwin Chadwick were elected members of this Committee. The petition, on the subject of the railway across Wimbledon Common, which has been presented by Dr. R. Farquharson, M.P., on behalf of the Society was read, and printed copies distributed amongst the members. A pamphlet on the importance of vaccination was read, ordered to be printed, and sent round with a letter to all the Metropolitan Boards of Guardians. It is hoped the Boards may allow the house-to-house visitors to leave them, while the epidemic of small-pox is raging in London, at the houses they call at. The great desirability of a constant water-supply was discussed, and a petition drawn up. On the application of the London Schools' Swimming Club for prizes, the Secretary was requested to make arrangements for a meeting, as the Committee expressed their wish to assist the club as much as possible.

Mr. Henry Monson has been elected Assistant Surveyor to the Local Board for the district of Acton, at a salary of £150 per annum. There were ninety-one applications for the office.

Mr. T. A. Pooley, B.Sc., F.C.S., has been appointed County Analyst for Essex.

ORIGINAL PAPERS.

SANITARY ASSURANCE.*

By Professor F. S. De Chaumont, M.D., F.R.S.,
Professor of Military Hygiene, Army Medical School, Netley.

It is obvious that the well-being of a people must depend upon the bodily and mental vigour of the race, upon its power of accomplishing the work demanded from it, and upon its capacity of enjoyment. For, although we lay down theoretically that the end and aim of life is 'duty', we should find on examination that practically it is a search after 'happiness', and that a capacity of enjoyment is an essential without which the end cannot be reached. It must therefore be our object, as far as possible, to increase and foster that condition of body which tends to the desired end, and that condition we call 'health'. To the young and the strong, who have never known any other condition, it may seem that too much fuss is made about a matter which they may think is not likely to concern them; but to those who have never known—and still more to those who have lost—that greatest of blessings, it is a question that comes home with the keenest effects. But neither are the young and the robust personally unconcerned in it, nor is it for any one a merely selfish consideration, for there are dire maladies from which the most iron constitutions enjoy no immunity, whilst it is the interest of all that their neighbours should be healthy, both that they may not be centres of disease, and also that they may continue to contribute their quota to the productive work of the community. It becomes more and more evident every day how much we must lean upon each other in this world, how much the comforts and amenities of modern civilization depend upon the accurate fitting in and working of the various parts of the body politic, and how more and more impossible it becomes for a man to live in any real sense apart from his fellows. To promote, therefore, our health and that of our household is not only a personally prudent act for our own immediate benefit, but also a good that we bestow upon, and a duty that we owe to, the commonwealth to which we belong and whose well-being we are bound as good citizens to seek.

There is one section of the community, however, who, we might at first think, would not only be injured by any successful endeavours in the direction indicated, but might be inclined to throw obstacles in the way: I mean those engaged in the different branches of the healing art. But, in the first place, it will be many a long day before stricken humanity is able to dispense with their services; and, in the second place, I think it may be placed to the honour of the profession to which I belong that its members have ever been foremost to prevent, as well as to treat, disease. Their efforts in both directions have been but partially successful, yet they have in many instances deserved both the measure of success they have attained to, and that greater measure which they fondly hoped for. I venture to be thus professionally egotistical, because I wish to point out how much of what we desire to do in the way of health preservation depends upon the observations and investigations of medicine. The researches which are being constantly carried out in every direction are daily, though slowly it may be, removing difficulties from our path, and rendering our road to success in our quest after health more easy, less winding, and more certain. It is by advances like these, parallel with the progress of medicine and the collateral sciences, that it becomes possible to lay down certain principles of so broad a basis as to allow of their being accepted by those who may differ on many points of the question. Thus we are in possession of evidence sufficient to show that certain forms of disease are more apt to arise in certain conditions of existence than in others, that there is (with individual differences) a certain concatenation of circumstances which generally leads to the outbreak of a particular malady or group of maladies. Thus we know that dwelling in marshy districts is usually followed by attacks of ague, or paroxysmal fever of various kinds; that destitution and crowding often give rise to another form of fever, viz., typhus; that want of particular articles of food, notably vegetable acids, will give rise to scurvy; and that exposure to the direct influence of persons affected with certain communicable diseases will light up those diseases in the healthy, as is the case with small-pox, measles, scarlet fever, and the like. We further know that by removing the immediate cause of those diseases they will cease to spread; that if we drain our marshes ague will cease; that if sufficient employment can be obtained for our population, so that they may be properly fed and decently housed, typhus will disappear; that if our soldiers and sailors get their rations, or fresh vegetables, or limejuice, scurvy will no longer be a terror; and that if we prevent contact with communicable diseases they will cease to be potent for evil. In some few instances we can go even further, for by the help of quinine we can brave the marsh-poison if need be, and armed with vaccination we may tend on small-pox stricken friends without material danger. We may reasonably hope, too, that a time may come when our armamentarium of prophylactics shall be still further extended.

But, besides the diseases I have referred to, there are the diseases which arise from causes within our dwellings themselves; and it is a curious, and to some extent a humiliating, fact, that in his struggle for existence man has quite as much to do in combating the foes he has himself created, as in fighting those which arise independently of him. What are the most fatal diseases in this kingdom? The Registrar-General's report shows that out of 700,000 deaths which occur annually in the United Kingdom, phthisis (or consumption) kills about 70,000, diseases of the respiratory organs 100,000, diarrhœa 33,000, enteric (or typhoid) fever 11,000, scarlet fever, 25,000, and diphtheria 3,500, or, in round numbers, about one-third of the whole mortality is due to the above diseases. Now, all those diseases are liable to be favoured or propagated by neglected house sanitation, and to the list many others might be added more or less dependent upon the same favouring cause. It cannot, of course, be contended that all are due to such a cause entirely, nor that we could with the best house sanitation prevent utterly the occurrence of them all; but we believe from the evidence we have that we could prevent some altogether from arising in consequence of causes within any specified dwelling, if it were put in good sanitary condition, and that we could at least modify and mitigate others to a very material extent. Thus, we believe, that by good sanitation of our dwellings we might entirely prevent enteric (or typhoid) fever, diphtheria, certain kinds of diarrhœa and sore

* Abstract of a Lecture delivered at the London Institution, March 15, 1881.

throat, and cholera declaring themselves in consequence of causes within the dwellings themselves. We should also aid in modifying most of the other zymotic diseases, as well as consumption, and a good many others, which frequently depend upon causes less under our immediate control.

Those diseases are propagated in insanitary dwellings by two main causes, foul air and foul water. The air, which is generally pure when it reaches us, is rendered quickly impure by being loaded with the products of respiration and transpiration from the lungs and skins of the inmates, by foul gases and particles from badly constructed closets, sinks and drains, and by all sorts of suspended matter from accumulations of dirt and general neglect of cleanliness. Water, again, supposing it to be pure on delivery, may be fouled by the cistern or pipe being brought into too direct communication with closets, sinks, or drains, or by the receptacles being allowed to become dirty by the access of various impurities arising through neglect. Those causes of disease are distinctly under our own control, and they arise in the following ways:—

1. Want of renewal of air in our dwellings.

2. From the house atmosphere being rendered impure through admixture with sewer emanations—the imperfect way, in short, in which our removal of excreta, slops, etc., is carried out.

3. Immediately connected with this fact is the question of the contamination of our water supply. Where there is storage in the house, the cistern or tank is too frequently in connection directly with the sewer, through the overflow pipe, or through the same supply being used for drinking purposes and for flushing of closets. All such arrangements are attended with the greatest danger, the more so that disease poison taken in through water reaches the system in a more concentrated and consequently more fatal form than when taken diffused in air. The remedy for this, supposing storage to be unavoidable and a constant supply unobtainable, is to take care that the drinking water cisterns shall supply water for drinking only, and that there shall be no direct communication between it and any drain or sewer, the overflow pipe discharging freely in the open air.

Could these arrangements be effectually carried out in our dwellings, there is no doubt that a large diminution would take place in the mortality from many diseases, and there seems even some probability, as I have already said, that certain maladies might disappear altogether. But we must further remember that it is not death alone that we have to dread, terrible as its effects often are upon a household. For every fatal case, we have to bear in mind, argues a considerable number of cases of illness, which, even if recovered from, may leave consequences behind them sufficient to affect the health of a lifetime, and to diminish the power of the sufferer for the work he has to do. The duration of illness alone is often a serious break in the life of a professional man, artizan, or labourer, a break which in some cases may mean the difference between comfort and penury, or between a successful career and a struggle for existence. I think I shall be understating the case when I say that each case of death argues about a dozen cases of illness, although the number is somewhat less in the severer diseases, such as enteric fever, which is fatal in one out of six or seven cases, and diphtheria, which kills one out of three. But if we take these two diseases, about the connection of which with bad house sanitation there is least doubt, and estimate the loss arising from them, the amount would surprise many people. In London alone the number of deaths from enteric fever in a year is about 1,000—from diphtheria, about 400. If, now, we assume that for each fatal case of the former there are six that recover, and of the latter two that recover, we have nearly 7,000 cases of illness to deal with, each lasting some five or six weeks, and representing some two or three months' incapacity for full work. We have thus something like 40,000 weeks of total loss of productive labour, and about as much more of partial loss, equal in the whole to not less than 50,000 to 60,000 weeks of total loss. We have only to multiply this number by the estimated average of earnings to see the serious loss the community must suffer from these causes alone, without reckoning the effects of the sequelæ of the diseases, or in any way estimating remoter losses or constructive damages which are undoubtedly incurred.

I have thought it necessary to bring out these points distinctly as a preliminary justification of the 'Sanitary Assurance Association'. The laws of health have been long investigated, more or less imperfectly, and no doubt many mistakes have been made, but still some progress has been accomplished; there is now a pretty general agreement as to those main principles of sanitation; we all agree that 'matter in the wrong place' must be got rid of completely and effectually, and, therefore, here there is likely to be a degree of harmony which is sometimes looked for in vain under other conditions. If, then, we can succeed in persuading the public of the real and pressing dangers to which they are exposed, we shall accomplish a great deal in the direction of successful sanitation, both among individual groups of the community and among the nation at large. They will refuse any longer to be at the mercy of builders and plumbers; they will insist upon knowing where the drains go to, and whether their basement is or is not being turned into a cess-pit, to the dire calamity of themselves and their neighbours.

It has, therefore, been thought that to this question of sanitation might be applied the principle of co-operation which has proved so successful in other ways; that if an association could be founded whereby people might be correctly informed as to the sanitary condition of their dwellings, and the necessary steps to be taken, and this at such fees as might be within the reach of all, and at the same time in the aggregate sufficient to command competent advice, there might be some hope of carrying matters to a successful issue. The idea first took a practical shape in Edinburgh, Manchester, and Salford, Wolverhampton, and some other provincial towns, and last year an organisation was started in London, consisting chiefly of medical men and architects, to form an association for the purpose of promoting house sanitation. On the 1st of November, 1880, at a meeting held at the Langham Hotel, the association was formally constituted under the title of the 'Sanitary Assurance Association'. Among those who took part in the meeting, and those who then expressed their approval of the objects in view were—Sir Joseph Fayrer (the chairman), Dr. Andrew Clark, Mr. Arthur Cates, F.R.I.B.A., Dr. W. S. Playfair; the President of the Royal Society; Dr. Lauder Brunton, F.R.S.; Mr. George Aitchison, F.R.I.B.A.; Dr. David Ferrier, F.R.S.; Mr. Edwin Chadwick, C.B.; Professor Corfield,

Professor Hayter Lewis, Dr. G. V. Poore, Professor Tyndall, and Mr. Mark H. Judge.

The objects contemplated are set forth in paragraph three of the memorandum, as approved of by the Board of Trade, as follows. A. The practical application of sanitary science generally, and especially the encouragement and development of proper systems of house drainage, water-supply, and ventilation. B. The examination, inspection of, and reporting on houses and buildings, or plans of houses and buildings, either erected, in course of erection, or to be erected, as regards their sanitary arrangements; the supervision by the officers of the association of any work done, or to be done, by or on behalf of the members of, or subscribers to, the Association in connection with the sanitary condition of such houses or buildings; and the granting of certificates relative thereto. C. The publishing of reports on matters connected with the progress of sanitary science in the United Kingdom and abroad, and the distribution at the end of each year of any surplus funds, or part of any surplus funds, to such institutions as are devoted to the advancement of sanitary science. D. The doing of all such other lawful things as are incidental or conducive to the attainment of the above objects.

These embrace all the most important points with reference to house sanitation, and to those points the work will be at present confined, leaving it, however, open to the Association to extend the scope of its inspection as experience may further suggest. The Executive Council consists of the following gentlemen: -Sir Joseph Fayrer, K.C.S.I. M.D., F.R.S.; George Aitchison, F.R.I.B.A.; W. H. Corfield, M.A., M.D., Professor of Hygiene and Public Health, University College; F. de Chaumont, M.D., F.R.S., Professor of Hygiene, Army Medical School; Mark H. Judge, Curator of the Parkes Museum of Hygiene; T. Hayter Lewis, F.S.A., Professor of Architecture, University College; Henry Rutherford, Barrister-at-Law; T. Roger Smith, F.R.I.B.A.

An important feature in the proposed work of the Sanitary Assurance Association is the furnishing of block plans of houses, showing the drainage and connections, when such are asked for. The desirability of this is undoubted and its necessity most urgent. It is really surprising how seldom, even in the case of public buildings, there is any record whatsoever of the course and direction of the drains. This is within my own experience, and the question has been brought forward again and again, and the necessity of registration insisted upon, but as yet little has been done. By our proposed arrangements, however, much may be accomplished in this way, for it is intended, among other things, to keep an assurance register, to which reference can be made. The advantage of this to the occupier or the intending purchaser of property is very obvious, and it may often save much trouble, expense, and danger. Again and again does it occur that when something has evidently gone wrong about the drains there is blank ignorance of their whereabouts, and floors have to be taken up, and prospecting diggings made all about to find them. Often, also, it happens that drains are disused, new ones laid, and the existence of the old forgotten, until the fact of their being favourite runs for rats, or the advent through them of indescribable smells, awakens the unfortunate occupier to a sense of the hidden danger he is exposed to. Registration of drain plans would also render it impossible, for very shame, that such pranks should be played, as occasionally is the case, in the laying of drains, such as carrying them under floors of dwellings, in direct opposition to contracts and stipulations, and even sometimes leading them across wells and through drinking-water tanks! But if such works were thoroughly inspected, such enormities would come to light, and lead both to the obviating of the danger and the detection and exposure of the reckless and ignorant perpetrator of such outrages against sanitary laws.

The following is the scale of fees proposed by the Sanitary Assurance Association: 1. An entrance fee of 10s. 6d. for all joining the Association; 2. An annual subscription of 10s. 6d., or a life composition of five guineas. This entitles the subscriber to place upon the assurance register one house in London rated under £20. For houses of higher value the following scale has been adopted:—

House rated at (in London).	First Year for Inspection, Report, Supervision, of Work, and Certificate.	Second and succeeding Years, for Inspection (Report if necessary) and Endorsement of Certificate.	When ordered by Subscribers, Block Plan shewing Sewers and connections.
£ £	£ s. d.	£ s. d.	£ s. d.
20 and under 20	*..	*..	0 10 6
Above 20 and not exceeding 40	0 10 6	*..	1 1 0
,, 40 ,, ,, 60	1 1 0	0 10 6	1 1 0
,, 60 ,, ,, 80	2 2 0	0 10 6	1 11 6
,, 80 ,, ,, 100	3 3 0	1 1 0	2 2 0
,, 100 ,, ,, 150	5 5 0	1 11 6	2 12 6
,, 150 ,, ,, 200	7 7 0	2 2 0	3 3 0

* No fee in these cases.

Houses rated above £200, by arrangement. A number of houses at reduced fees.

All houses placed on the assurance register to be thoroughly inspected by the officers of the Association, who will supply members and subscribers with written reports thereon, specifying what work is required to put the houses in proper sanitary condition. After houses have been reported upon and the members or subscribers have had the work done under the supervision of the officers of the Association, and to their satisfaction, certificates will be granted, and thenceforth members' houses will be inspected yearly upon the terms of the above scale.

Arrangements will also be made to inspect and report upon houses outside the metropolitan district at a reasonable rate, graduated according to distance. The value of the certificates granted by the above plan must be at once obvious to all, seeing that a time will assuredly come when intending tenants or purchasers will insist upon the production of such documents before committing themselves to the tenancy or purchase of property. To some members of the community it may be a question absolutely of life or death, seeing that there is no doubt that some are much more susceptible to the influence of sewer poison than others, and that in some families enteric fever or diphtheria seems to find naturally a congenial soil. In the case of hotels and lodging houses, the possession of a certificate will be very important, both to the proprietors and to the visitors, especially when the latter are invalids, or perhaps women taking up their residence for the purpose of being confined. This last condition is a very serious one, if the patient be exposed to sewer air, nothing being more likely to produce complications of various kinds, from merely protracted convalescence to fatal puerperal disease. Again, all surgical operations are greatly affected by sewer air, to which few surgeons would be willing to expose their patients, even with all the resources of aseptic dressing, great as has been the boon to humanity which the enlightened treatment introduced by Professor Lister has conferred. In many other diseases, too, the convalescence is

prolonged or altogether prevented, and where the case must inevitably prove fatal sooner or later, the end is often unduly hastened by exposure to sewer air. But perhaps the best gauges of the purity of air are our little children, for none show sooner the effects of its foulness, whether it be due to ordinary want of ventilation or the direct introduction of sewer-poison. The elasticity of youth disappears, the roses fade, comparatively trifling infantile disorders become aggravated into grave maladies, whilst the really serious diseases, such as scarlet fever and the like, become triumphantly fatal. There is, in particular, one fatal malady, still often recorded as 'infantile remittent fever', which has undoubtedly its origin in sewer-poison, being in most cases neither more nor less than enteric or typhoid fever inaccurately diagnosed. This is a frequent cause of death among the young, and it is entirely preventable. For the accuracy and trustworthiness of the certificates issued, the chief sanitary officer and the surveyor will be personally responsible. The value of such a plan of inspection and report has been already fully recognized in several places, particularly in our favourite watering-places, the resorts both of invalids and pleasure-seekers. There the local authority insists in more than one place on every house being inspected and approved by the medical officer of health before it is permitted to be occupied. Certain rules are laid down, with reference especially to drainage arrangements, which must be complied with. These rules are not very severe, still they are valuable, and as time goes on they may be extended, when the public become convinced of their value and necessity. I have had personally an opportunity of ascertaining those points at Torquay, which is under the charge of my friend, Mr. P. Q. Karkeek, and at Southport, in Lancashire, under my friend Dr. H. Vernon; and I believe the same or similar regulations are in force at other places of known resort.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

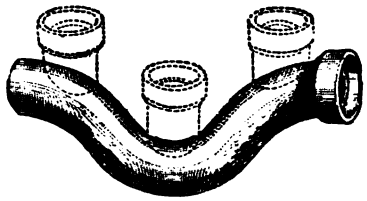
BY OUR SPECIAL COMMISSIONER.

IV. LAMBETH HOUSE-DRAINAGE. HOUSE-DRAIN DISCONNECTORS FROM STREET SEWERS, ETC.

IN my last Report, I described in detail the various kinds of intercepting and disconnecting appliances which are employed in severing the direct contact of house-waste deliveries from the house-drain, and I will now explain the methods of so separating the house-drain from the sewer or cesspool, as to render any residence perfectly healthy, and free from the inroad of sewer air, properly so-called. As a rule, there is very little pressure of foul air, at least in the sewers of properly sewer-ventilated towns and cities; but it is unfortunately otherwise in the case of imperfectly sewered towns, and in houses connected with a cesspool. Under such last mentioned conditions, it becomes an imperative matter to form a disconnecting medium between the house-drain and the sewer or cess-pool. And it is now an approved practice to fix some such disconnection even in cases where the house is drained into a well-treated sewer, and no wise sanitarian will dispense in any state of things with such a most desirable contrivance.

At the spot where these disconnectors are fixed, fresh air is taken into the house-drain, and this fresh air-current consequently traverses the drain continuously, and is as constantly charged at the ventilating pipes provided for the purpose, at each end of every ramification of the drain. In small houses, when the soil-pipe is carried up to the roof sufficiently remote from windows and chimneys, this will be found sufficient; but if the house be a large one, and especially if the soil-pipes be situated near to the disconnecting arrangement, it is a wise provision to erect a special ventilating pipe carried up in like careful manner.

This necessary disconnection between the house-drain and the sewer or cesspool can be fairly carried out by interposing, at the outfall end of the house-drain, a syphon such as that figured at No. 10, with one inlet only.

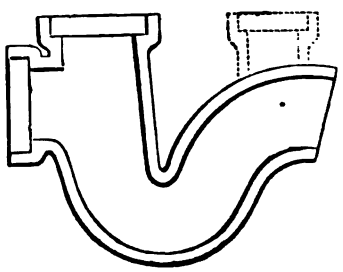


No. 10 Syphon.

This syphon, which is made to any bore up to 12 inches, would, in order to cut off the drainage of a house from the sewer or cesspool, only require the inlet on the left-hand side, although that on the right-hand side is also frequently added, in order to better cleanse out the dip of the trap, and in order to get a passage for canes or rods on in the direction of the outfall. The lower and central entry into the trap is of no advantage when practising disconnection.

Fortunately, these syphons can be obtained with any arrangement of inlet, shown by the dotted lines. The fresh air would be taken in on the right or house-side of the syphon, and discharged continuously at the upright ventilating pipes provided for the purpose.

A trap somewhat more generally useful for disconnecting purposes, is that known as No. 31. In



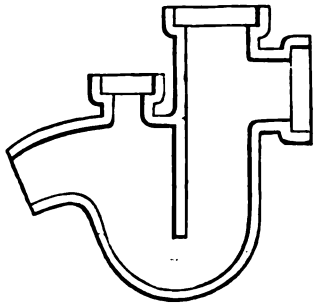
No. 31 Syphon.

this case the house-drainage enters the syphon by way of the perpendicular socketed inlet, and flows out at the opposite aperture, leaving the trap with an hydraulic seal in the bottom of the trap. The fresh air enters by way of the horizontally-lying inlet, and courses along the drain of the house. This last-mentioned flat entry is also most useful as a receiving inlet for rain and surface water, slop-wastes, and cistern overflows, as any kind of suitable dished-

grating can be placed over it, when the inlet has been raised level with the surface of the ground.

Another form of this kind of simple disconnection is afforded by the adoption of the trap No. 30, which is somewhat similar in form, but which is constructed for deeper drains, inasmuch as the outfall dips more downward.

The intake of fresh air is the same as in No. 31,



No. 30 Syphon.

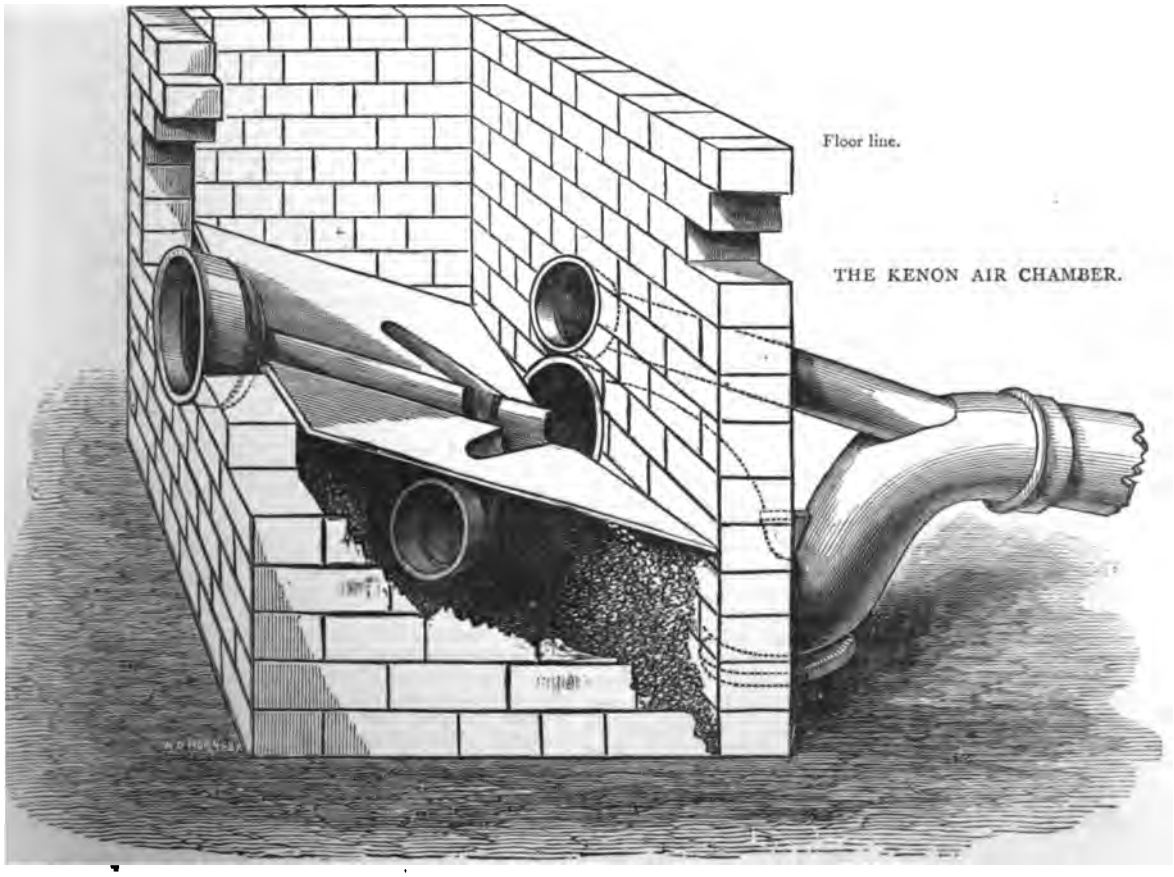
but provision is made in this pattern for a small pipe to be placed on the sewer or outfall side of the trap, which would ventilate the drain beyond the trapping water. A similar inlet to the syphon is shown by the dotted lines on pattern, No. 31. In point of practice, however, it has been found mostly undesirable to use these inlets for this purpose, as they ventilate the drain beyond the disconnection, up the wall of the house, and they are only used when the drain or sewer beyond the air intake is inadequately ventilated.

For some six or seven years past it has been found convenient to make use of more complete disconnecting contrivances, constructed in one, or at most two pieces of stoneware, with an open channel between the house-drain outfall, and the trapping syphon, after the manner devised by the late Mr. Potts, a well-known sanitarian. I figure the latest attempt in this direction, suggested by Messrs. Corfield and Judge, and manufactured for them by Messrs. Doulton and Co., Lambeth.

This modification of an air-chamber, usually built up in various pieces, with loose half-round pipes, and separate syphons with inclined inlet junctions beyond, so as to allow of cleaning out the drain to the flap in the sewer, is a step in the right direction without doubt. Here is combined the kind of air-chamber long ago used by Mr. Rogers Field, Mr. Eassie, and others, with the raking-pipe, leading beyond the trapping-water, lately devised by a contractor in Fulham Road, whose special apparatus is also manufactured at Messrs. Doulton's establishment. The only drawback which it has, lies in the difficulty of making this air-chamber-floor suitable for flat-lying drains, a thing not always obtainable.

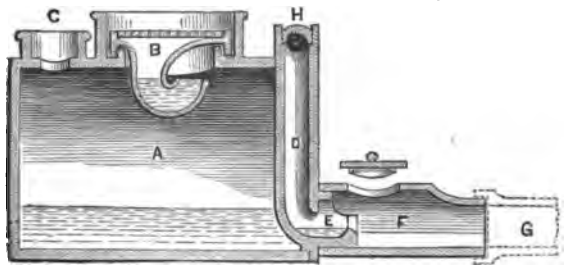
Messrs. Doulton, however, as is well known, are willing to manufacture goods from any pattern supplied to them by sanitary engineers, and this difficulty may in time be overcome, the floor of the chamber also being fitted with movable curves, such as Parnell's, to be inserted in the open pipe only when really required. In all this class of disconnecting chambers, an inlet of fresh air is required, and this is provided for either by an open grating fixed above the open pipe, or by an inlet ventilating pipe led into the chamber below the floor line.

In cases where the house drains have a bad fall



THE KENON AIR CHAMBER.

as it is called, it is wise to associate the drain, at the farthest end from the outfall, by a flushing contrivance of some sort, and Field's self-acting flush tank, also manufactured in stoneware by Messrs. Doulton, furnishes the best example of this wise provision.



Field's Self-Acting Flush Tank.

The action of this tank is very simple, and a mere sink-waste will suffice to set it in action, and cause it to deliver a certain number of gallons of liquid, in a body, down the drain. In connection with disconnecting contrivances, such as I have described in this article, its desirability is manifest, as when the body of the tank A is full, and the syphon B as well, a discharge of the whole contents will commence towards the outfall pipes F and G, and the drain will be efficiently scoured. It is also, in itself, a disconnecting apparatus, as the sinks, baths, etc., delivered over its open grating seen above B. Of course, it cannot be used for water-closet discharges. The inlet at C is for ventilation.

The next article in this series will treat of the various kinds of Lambeth-made drain pipes.

A MODEL ACT AGAINST ADULTERATION.

Drafted by G. W. WIGNER, F.C.S., Hon. Secretary of the Society of Public Analysts.

TEN years ago food adulteration was almost universally prevalent in England, and the short Act which was passed in the year 1872 did very little to stop it. From time to time statements were published, not only as to the character of the adulterations practised, but also as to the proportions which, although doubtless in some cases overdrawn, showed a deplorable picture as to the state of impurity of the food-supply of this country. But ten years have changed the whole aspect of affairs; adulteration has decreased so that, instead of 50 or 60 per cent. of the samples purchased being found adulterated, only some 20 per cent. are now found impure; and still more noteworthy of the success of the English anti-adulteration Acts, lenient as they are, and containing as they do, such obvious modes of escape for those who know how to adulterate scientifically, is the fact that they contain enough sound matter to have formed the basis of legislation for several European countries.

The Society of Public Analysts have done good work in this respect, not only by working hard for the amendment of our English law, but by disseminating information as to the defects in that law, and as to adulterations to be guarded against in other countries. One consequence of this work is that the German law, as at present enforced, is practically that laid down by the acting public analysts in England, with the introduction of such improvements as practice between 1875 and 1880 had shown to be necessary. In several other cases draft laws have been prepared much on the same lines, and evidently with the practical results obtained by the Society of Public Analysts in view.

The net result is that in ten years England has shown an immense advance in the suppression of adulteration, and this suppression has been obtained without any real hardship on the ordinary trader.

The Government of the United States of America appear now to have found that they must also take up the question, and the draft Act and Essay, prepared by Mr. Wigner, the Honorary Secretary of the Society of Public Analysts, which obtained the first prize offered by the National Board of Health of the United States, have been, as regards their essential features, adopted into the draft National law, presented by that Board to Congress. This shows the effect which the study and persistent action of the one country has had on the other.

The draft Act, prepared by Mr. Wigner, is as follows :—

PROPOSED DRAFT OF A NATIONAL ACT.

An Act to prevent the Adulteration of Food and Drugs, or the Sale of Adulterated Articles of Food or Drugs.

WHEREAS it is reported that adulterated or spurious articles of food and drugs are manufactured, imported or sold within the United States; and also that damaged or diseased articles of food or drugs are manufactured, imported or sold; and whereas, in order to prevent injury to the public health, or fraud, injury or prejudice or loss to the purchaser of such articles as those hereinbefore referred to, it is desirable to suppress such practices. Be it enacted :—

1. For the purpose of this Act the definition of an adulterated article shall be that which is given in Schedule A of this Act, and wherever an adulterated article is herein referred to the phrase shall be interpreted in accordance with that definition. The term 'food' shall include every article used for food or drink by man, except water. The term 'drug' shall include all medicines for internal or external use.

2. State boards of health shall be constituted, which shall consist of at least one analyst, one physician, one barrister, and one retired merchant. No member of these boards shall, while acting as such, be directly or indirectly engaged in the sale of food or drugs. The first members of such boards shall be appointed by the House of Representatives of each State, and they shall be appointed for three years. The members of this board shall be remunerated for their services at the rate of ..... dols.

3. The first duty of each of these boards shall be to appoint a public analyst, or public analysts, and an inspector or inspectors, and to arrange for the payment of their remuneration. The remuneration of public analysts shall consist of an annual salary not exceeding ..... dols. and the sum of ..... dols. per sample analysed. When a public analyst is called to give evidence in any case, he shall receive, in addition, the sum of ..... dols. per day and his travelling expenses. The public analyst shall be appointed for a term of not less than three years. The State board may, if they think desirable, provide and furnish a laboratory for him. The remuneration of the inspectors shall consist of a sum not exceeding ..... dols. per annum, and the sum of ..... dols. per day travelling expenses when actually travelling on their business. Every inspector so appointed may appoint a deputy to act for him when desirable, at a salary of ..... dols.

4. Every public analyst so appointed shall be an analyst who has been in actual practice for two years, and who is skilled, and has had practical experience in chemical and microscopical analysis.

5. Every inspector to be so appointed shall be a man of due experience and discretion, and the choice shall by preference be made from those who have already had experience in other sanitary work.

6. It shall be the duty of each inspector appointed under this Act, from time to time, to procure samples of every article of food or drink or drugs exposed for sale, or on sale, in any street or shop or store, or other place, or being

delivered to consumers, and to submit these samples to the public analyst for analysis. In purchasing these samples the inspectors shall, as regards the class of goods purchased, and the time of purchase, act under the direction of the public analyst, subject to any control by the State boards. The number of such samples shall not, in any district or township, be less than one per annum per thousand of the population.

7. When an inspector has purchased any sample, he shall divide it into two portions, each of which shall be sealed with an official seal. Should the vendor request it, he shall be at liberty to affix his own seal to each parcel. The inspector shall forthwith transmit one portion of the sample by mail, express or otherwise, to the public analyst, or shall personally deliver it to the public analyst, and shall retain the other sealed portion of the sample until he receives the certificate of the analysis thereof, or, in case the sample prove to be an adulterated one, until the case has been heard, and decided by the Court.

8. It shall be competent for any purchaser of any article of food, drink, or drugs, who may suspect the same to be adulterated, to submit the same to the public analyst for analysis, upon payment of a fee of 3 dols. per sample, but it shall be the duty of the purchasers in such case to sign a declaration stating where and of whom the sample was purchased, and the price paid for it, and the name under which it was sold.

9. It shall be the duty of the analyst to analyse or examine all samples submitted to him by the inspectors or purchasers as aforesaid, and to report upon them by a certificate, on a form similar to that given in the schedule to this Act. The said certificate shall be *primâ facie* evidence in any Court, so that the attendance of the analyst may be dispensed with. It shall be the analyst's duty to state in this certificate whether the article is adulterated or not adulterated, according to the meaning of this Act, and if it is so adulterated he shall state, as far as practicable, the nature and percentage of that adulteration, and whether the same would render the article injurious to health, and whether the same is so small in quantity as to render it desirable not to prosecute for a first offence, together with any other observations he may think it desirable to make.

10. From and after the passing of this Act no person shall, except as hereinafter provided in Section 11, sell or offer or expose for sale, or deliver any adulterated article, either in the streets or in any store or market or shop or stall or other place of business, or on a round from house to house, under a penalty for the first offence not exceeding 50 dols., for the second offence a penalty not exceeding 100 dols., and for the third and subsequent offences a penalty not exceeding 250 dols., and in addition to the latter penalty the Court shall, in the case of a third offence, order the publication of the name and address of the vendor, and of the fact of his having been twice or more frequently previously convicted, in the local or district papers at his own cost. But if the certificate of the public analyst shall state that the sample has been so adulterated as to be injurious to health, the Court is hereby empowered to increase the penalty imposed to any sum not exceeding five times the amount of the maximum penalty laid down for first, second, and third offence. The fines and other payments shall be applied towards the expenses incurred under this Act.

11. Notwithstanding the preceding sections of this Act, it shall be lawful to sell any admixtures of substances or substitutes for substances, such as are already recognised as ordinary food products, provided that the same are not injurious to health, and that the vendor by himself or his servants makes a declaration of admixture to the purchaser at the time of, or prior to, the delivery of the article, either by means of a label affixed to the sample, stating distinctly that the substance is a mixture, or by a verbal declaraton that the article is sold as a mixture.

12. The limits attached to the definitions, and forming Schedule B of this Act shall, in the first instance, be taken as the limits of strength or purity of the various articles therein enumerated, but it shall be competent for the State Board of Health, from time to time, to revise the figures therein contained, or to add other limits to them.

13. Every person selling, or offering or exposing any article of food or drugs for sale, or delivering any article to purchasers, shall be bound to serve or supply any inspector appointed under this Act, who shall apply to him for that purpose, and on his tendering the value of the same, with a sample sufficient for the purpose of analysis of any article which is included in this Act, and which is in the possession of the person selling, under a penalty not exceeding 50 dols. for a first offence, and 100 dols. for a second and subsequent offences.

14. Each analyst shall submit a quarterly report to the State Board of Health, giving the results of all the analyses made by him during the preceding quarter, and these reports shall be published either quarterly or annually.

15. The analysts appointed by the various States shall from time to time meet and decide upon the most suitable and efficient processes for the various analyses to be made. These processes shall be submitted to the State Board of Health, and after receiving their sanction, they shall have the force of a schedule to this Act, until again amended by the analysts so assembled, and the amendment confirmed by the State Board.

16. No public analyst shall give a certificate of the adulteration of any article of food or drugs, unless he has worked according to one of these processes.

17. The State Board of Health shall from time to time, upon the recommendation of the analysts or of their own motion, fix certain limits or standards of a small amount of adulteration, in which a vendor shall not be prosecuted for a first offence, but only cautioned. These limits or standards shall not, however, apply at all to a second offence, but in every other case it shall be the duty of the inspector or purchaser to prosecute.

18. In any prosecution under this Act it shall be a good defence to prove that the article in question was purchased by the vendor in the same state as it was sold by him with a written warranty, either on the invoice or bill, or accompanying the article, that the article was not adulterated, and the prosecution shall thereupon be transferred to the original vendor.

19. All proceedings under this Act against any person charged with having violated any of its provisions, shall be instituted, and notice thereof given to the person charged within forty days of the alleged commission of the offence.

20. If, at the hearing of the case, the accuracy of the analysis is questioned, the sealed residue of the sample shall be transmitted to the State Board, who shall thereupon submit the same to some other public analyst to be selected by them, and the further hearing of the case shall be adjourned until this analysis is made, and in this case both public analysts shall be called as witnesses, and their attendance fees and travelling expenses shall be paid by the vendor, if the second analysis confirms the original one, or by the State Board if it essentially differs therefrom. Regard shall be had in this case to any decomposition which may have taken place in the sample.

21. Every person who shall wilfully apply to an article of food or a drug, in any proceeding under this Act, a certificate or warranty given in relation to any other article or drug, shall be guilty of an offence under this Act, and be liable to a penalty not exceeding 100 dols. Every person who shall give a false warranty in writing to any purchaser in respect of an article of food, or a drug sold by him as principal or agent, shall be guilty of an offence under this Act, and be liable to a penalty not exceeding 100 dols. And every person who shall wilfully give a label with any article sold by him, which shall falsely describe the article sold, shall be guilty of an offence under this Act, and be liable to a penalty not exceeding 100 dols.

22. Nothing in this Act contained shall affect the power of proceeding by Statute Law, or take away any other remedy against any offender under this Act, or in any way interfere with contracts and bargains between individuals, and the rights and remedies belonging thereto.

23. This Act shall take effect, and be in force, from and after its passage and publication.

SCHEDULE A.—DEFINITION OF AN ADULTERATED ARTICLE.

An article shall be deemed to be adulterated within the meaning of this Act—

A. In case of drugs :—

1. If, when sold under or by a name recognised in the *United States Pharmacopœia*, it differs from the standard of strength, quality, or purity laid down therein.

2. If, when sold under or by name not recognised in the *United States Pharmacopœia*, but which is found in some other pharmacopœia or other standard work on *Materia Medica*, it differs materially from the standard of strength, quality, or purity laid down in such work.

3. If its strength or purity fall below the professed standard under which it is sold.

B. In the case of food or drink :—

1. If any substance or any substances has or have been mixed with it so as to reduce or lower or injuriously affect its quality, strength, purity or true value.

2. If any inferior or cheaper substance or substances have been substituted wholly or in part for the article.

3. If any valuable constituent of the article has been wholly or in part abstracted.

4. If it be an imitation of, or be sold under the name of another article.

5. If it consist wholly or in part of a diseased or decomposed, or putrid or rotten animal or vegetable substance, whether manufactured or not, or in the case of milk, if it is the produce of a diseased animal.

6. If it be coloured or coated, or polished or powdered, whereby damage is concealed, or it is made to appear better than it really is, or of greater value.

7. If it contain any added poisonous ingredient, or any ingredient which may render such article injurious to the health of a person consuming it.

SCHEDULE B.—LIMITS.

The following shall be deemed limits for the respective articles referred to :—

Milk shall contain not less than 9.0 per cent. by weight of milk solids, not fat, and not less than 2.5 per cent. of butter fat.

Skim milk shall contain not less than 9.0 per cent. by weight of milk solids, not fat.

Butter shall contain not less than 80.0 per cent. of butter fat.

Tea shall not contain more than 8.0 per cent. of mineral matter, calculated on the tea dried at 100° Cent., of which at least 3.0 per cent. shall be soluble in water, and the tea as sold shall yield at least 30.0 per cent. of extract.

Cocoa shall contain at least 20 per cent. of cocoa fat.

Vinegar shall contain not less than 3.0 per cent. of acetic acid.

SCHEDULE TO ACT.—APPENDIX (*Form of Certificate.*)

To Mr. .....

I, the undersigned, public analyst for the district of ....., do hereby certify that I received, on the ....day of.....18..., from....., a sample of....., numbered....., for analysis, and have analysed the same, and declare the result of my analysis to be as follows :

I am of opinion that the same.....

As witness my hand this.....day of.....18...

The draft United States Act is, without doubt, a great improvement on the English Act, as it includes a distinct and clear definition of an adulterated article, and by the simple prohibition of the sale of any article included within this definition, it will remove at least one-half of the frivolous defences which have been raised from time to time in this country by retail vendors whose misfortune it has been to be detected in their profitable malpractices. At the same time it leaves it perfectly open to those who manufacture or sell legitimate mixtures which are bought by the public under their well-understood names to carry on their business without any hindrance. The statement of offences is now limited to the simple fact that no vendor shall sell an adulterated article, and the definition of an adulterated article is short and clear.

There are various other changes proposed in the mode of carrying out the Act, some of which strike us as being of value. Nothing has tended more to the discredit of public analysts' work in this country than the fact that they have worked in some cases according to variable processes; but now it appears probable that in the United States, processes prepared, and strictly defined by the National Board of Health, will be employed in the analysis of every adulterated sample. This would practically shut the door to those unpleasant differences of opinion which have occasionally arisen here.

The appointment of analysts is not to be left in the hands of local authorities, but is to be made by the Secretary of the Treasury from certain names, submitted to him by the National Board of Health, and as the National Board itself consists essentially of experts, possessing special knowledge on the subject, it is probable that the character of the appointments made will be more satisfactory than was the case in the earlier days of the Food Adulteration Act in England.

There are several other points mentioned in Mr. Wigner's essay, which, although not at present embodied in the Act before Congress, may probably be introduced into it, and increase its practical value. Among these is the clause that the analyst himself should give directions to the inspector as to the class of goods it would be most desirable for him to purchase, leaving the inspector at perfect liberty to procure the samples from whatever shop or stores he pleased.

The proposed provision that every public analyst shall have been at least two years in private practice before he is appointed as a public officer affords what would certainly be considered, from a tradesman's point of view, a great safeguard.

As to the check analyses, which will be necessary under any system, these are proposed to be made, not by excise officers comparatively unacquainted with food analysis, but by some other public analyst specially appointed by the National Board of Health, and whose experience must, in the opinion of the Board, be such as to justify him in expressing a reliable opinion upon the point. But beyond this comes another proviso, which, from a professional point of view, is certainly of the utmost importance, namely, that, in the case of a difference of opinion, both analysts are to be called to give evidence, so that the reasons for the difference between the results, whatever they may be, may, if possible, be disclosed by *vivâ voce* examination.

Taken as a whole, if this United States Adulteration Bill passes, it will be a point greatly to the credit of English scientists, that they have succeeded so far in elaborating the details of a law for the suppression of food adulteration, and improving an Act which, —notwithstanding its inherent defects—has, on the whole, worked fairly well in England.

The Boarding-out Order (November 1870) of the Local Government Board has been adopted by the Cambridge Guardians by 14 votes to 8, and will be applied to the orphan and deserted children in the workhouse. The Duchess of Leeds has offered her services as a member of the Boarding-out Committee.

THE SANITARY SERVICE:

SOME SUGGESTIONS FOR ITS SUPPLEMENTARY SUPPORT BY THE STATE.

By R. BRUCE LOW, M.D. Edin., S. Sc. C. Camb.,
Medical Officer of Health for the Helmsley Rural Sanitary District, Yorkshire.

IT seems strange that, with all its importance, the Sanitary Service should secure so small a share of public recognition in this country, and that those who lead the fight against the unseen, but deadly, foes lurking in the polluted air of our slums, in the poisoned waters of our wells, or in the pestilential gases of our sewers, go unrewarded, although they may lose life or health in the contest; nay, worse, may undergo persecution, or be deprived of their position, if they have ventured to remonstrate with an ignorant and self-conceited authority. It is admitted that more persons die from preventable disease than are killed by the swords and bullets of the enemy; why, therefore, should a small expenditure be grudged by the nation for the Sanitary Service, which is responsible for the defence of the people against the attacks of preventable disease, and why should the Sanitary Service, which is constantly carrying on the fight, and protecting the people, be unrecognised by many politicians, and almost neglected by our leading statesmen? The lowering of the annual death-rates throughout the country excites no emotion of thankfulness or gratitude for lives saved. Take the case of a man, who has devoted his whole life to building up the foundations of Sanitary Science, who has, by his keen grasp of figures, pointed out the weak places in our defences against preventable diseases. A vacancy occurs, his life's work has prepared him for the office, but the place is secured by a comparatively untried nominee of the Government, and the faithful worker is permitted to retire into obscurity, as many of his fellow-workers have already done, unhonoured, unrewarded, for their life-long services to the nation. Again, those who fight in the rank and file of the Sanitary Service are but too often dismissed or persecuted by petty spite, if they appear to distinguish themselves in the struggle against disease. Treatment like this has caused many capable men to leave the ranks in disgust, their places being supplied by raw or inefficient recruits, of less courage and skill in the use of the weapons of preventive medicine. The attention of Parliament is occupied by many weighty questions, but the *salus populi* ought still to be the *suprema lex*.

The distinguished leaders of the two great political parties have acknowledged the vital importance of sanitation; in fact, one of them led us to expect that legislation, for a time, would consist of '*sanitas sanitatum, omnia sanitas*'. This expectation has not been realised, although it is high time that sanitary legislation should secure its share of attention from statesmen. One cannot scan the public prints without seeing some outbreak of disease described as originating from polluted water, milk, or the like. Who is to blame for this? Not the Medical Officer of Health in most cases. He can only continue to point out, again and again, what ought to be done, but he himself is powerless to move the machinery of the Local Executive. At present, the small ratepaper is omnipotent. He is willing to risk the health of himself and his family, as well as of the community, so long as a half-penny in the pound is not added to his rates. Till ratepayers are sufficiently enlightened to understand that the death or disease of the bread-winners means pauperism and suffering, and therefore increased taxation, not to speak of the indirect danger to property and morals, the appointment of Health Officers should be made by the State. Government could then require all its officers to pass a 'one portal' examination in State Medicine, in order to secure that special knowledge which, I regret to say, is wanting in some, at least, of the Health Officers of the present day.

The average ratepayer returns his representative to the Local Board, not to protect the public health, but that, by means of the closest parsimony, and regardless of disastrous consequences, he may pare down the expenditure to the narrowest compass. I have no wish to interfere with the rights of representation, nor with the benefits of local self-government, but in vital questions, such as this, the matter becomes of national importance; for the average ratepayer, at present, is unfit to decide who will be the best guardian of the public health. If the appointment of Health Officers was in the hands of the State, or even protected by it, we should not see and hear of the eviction of capable men from their posts; and the constantly recurring scandal of suspending conscientious workers, for no other fault than doing their duty, would cease. Many Sanitary Boards have been known to elect men on the understanding that they shall do no work, and thus in some places the administration of the Public Health Acts becomes worse than a farce; it is a disgrace to the country. To prove this assertion, let me quote some passages from recent issues of the *British Medical Journal*. In speaking of the condition of one locality, where these frequent outbreaks of preventable disease had occurred, the editor remarks that the Authority in question 'have not caused the periodical inspections of the district to be made, as required by law, and the appointments of their Sanitary Officers have been made on such a footing, as to render it vain to expect that the duties can be efficiently performed. Many complaints have been locally made of this insanitary state of the district, but the Local Board paid little heed to these representations. It cannot be doubted that, had the supervision of the district been of a nature at all approaching efficiency, these insanitary conditions, with the sickness and mortality consequent upon them, would not have existed'. This quotation shows the glaring incompetence of this particular authority, and the complete absurdity of its sanitary appointments. As an illustration of the inefficiency of some Medical Officers of Health, who have drifted somehow or other into the sanitary service without either the proper knowledge of their work, or the inclination to perform it, I quote again from the same Journal. Referring to the disgraceful condition of a district, which had necessitated the visit of a Local Government Board Medical Inspector, it says, 'It is not easy to understand why the valuable time of the undermanned Medical Department of the State should be frittered away in inquiries of this character, whilst there are so many large questions of public health that urgently need solution. The fault possibly lies in the insufficient character of the local reports, but it is, to say the least, singular that, after eight years of presumed sanitary work, actual facts as to the circumstances of the health of a district, are only to be discovered in this fashion'.

It must be seen from what has been already stated that the Sanitary Service of the country is in great need of State support. It is acknowledged by the Central Authority that the annual reports of the Health Officers are very unequal in character. This

arises from two causes, the want of special knowledge, and the want of a proper model upon which the Medical Officer of Health can fashion his report. These annual reports are of great importance. To encourage the production of better work I beg to submit two suggestions; I quote again from a recent number of the *British Medical Journal*, showing the necessity for more care in reporting. 'The report by the Medical Inspector of the Local Government Board is only remarkable as showing how the time of the Medical Officers of the Central Department is wasted by their having to find out actual sanitary conditions existing in districts, where the reports of the Local Officers of Health ought to have made such inquiries unnecessary. Dr. Airy's report is, indeed, just such an one as any Health Officer, desirous of doing his business, would have presented to his Authority as one of his first duties.'

My suggestions are briefly these: (1) That a small bonus be given annually to Health Officers who do their duty up to a certain standard. This principle is already acknowledged in the vaccination grants, where rewards are given for work of a sufficiently good quality. To extend these grants to those who assist in preventing the spread of fever, phthisis, or any other disease, which may be diminished or prevented by the sanitary surroundings of a community, is only logical and equally deserving of the attention of the State. The vaccination grants are known to stimulate public vaccinators to a more careful discharge of their duties, and there is no doubt that grants to Health Officers would increase the quality of the work done, the public reaping the advantage. (2) I would suggest that from the annual reports of Health Officers certain specially good ones should be selected, printed at the public expense, and distributed among the Medical Officers of Health over the whole country. If the selection comprised various kinds of work, as from cities, small towns, and rural districts, each Medical Officer of Health would find a model upon which to make his report. If, in addition to this, the special reports of the medical staff of the Central Department were systematically sent to each Health Officer, as soon as they were printed, the observing faculties of Medical Officers would be cultivated and greatly improved, special knowledge extended, and, as a matter of course, the usefulness of the service to the community at large much increased. These reports from the Central Department are often marvels of skill in the art of reporting; it is therefore a great pity that the entire sanitary service of the country should not benefit by them. If the general work of Health Officers could be stimulated and improved by these methods, the annual reports from all parts of the country would gradually develop into a systematic and reliable mass of information on all health subjects, presented in an uniform manner, and available by the Government as a basis for advanced and enlightened sanitary legislation. It is a good sign of the times that the recent vacancies in the medical department of the Local Government Board have been filled up from the ranks of the working Medical Officers of Health. The staff of medical inspectors, however, is too small for the work. In the event of the appointment of a capable and responsible Minister of Health, a considerable adddition to their number would be required. In view of the work to be done, it is to be hoped that these promotions will be made like the others, as rewards to distinguished Medical Officers who hitherto have had scant justice done to them, either by the State or by the public.

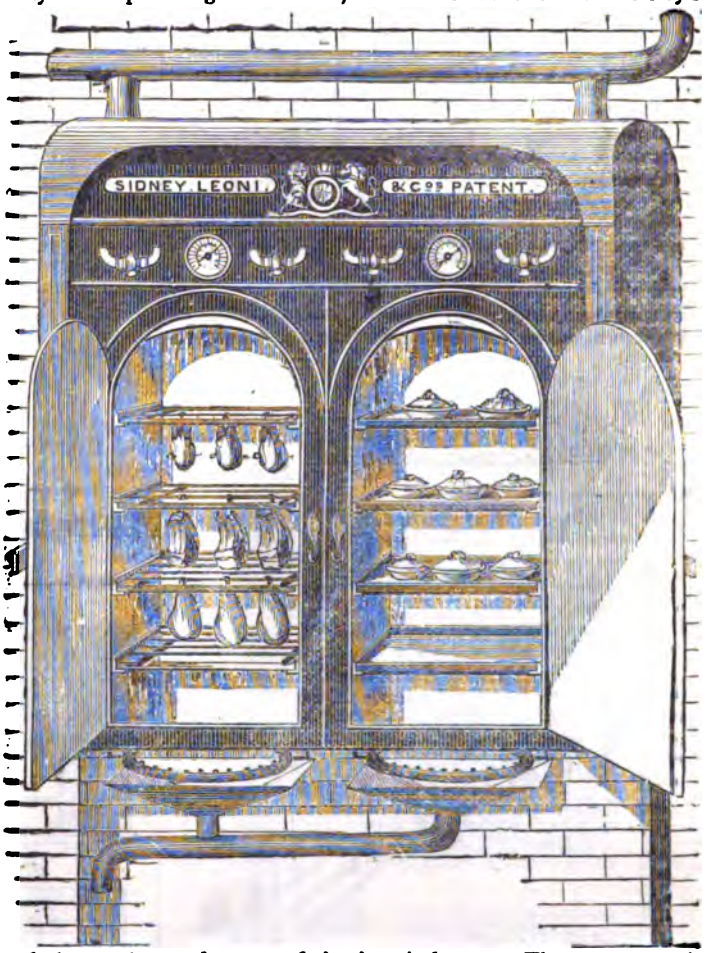
It would, indeed, be a happy day for the nation if the Cabinet could be persuaded to entrust the sanitary service of the country to an earnest Minister of Health, a man of learning, of scientific acquirements, of great administrative capacity, one who has served on sanitary commissions before devoting himself to politics, such a man, for example, as Dr. Lyon Playfair. Under such auspices, a bright era would be inaugurated, and the science of preventive medicine, 'the medicine of the future', would enter upon its golden age in this country.

GAS COOKING AND HEATING APPARATUS.

HITHERTO the gas cooking apparatus to which we have referred have been mainly those suitable to the requirements of the ordinary household; but we have yet to examine it in its relation to the large business establishments, public institutions, and mansions of the aristocracy, who adopt it as the means for supplying their daily cooking wants, and to these sources we may look for more reliable information as to its advantages as a medium for the preparation of food. In reviewing this part of the question, we have only to mention the name of Leoni & Co., of the Adamas Works, St. Paul Street, New North Road, to provide us with a plethora of examples. In certain respects Mr. Leoni stands alone amongst gas cooking range makers; having completed some of his largest works at a time when cooking by the agency of gas was comparatively in its infancy, and when scarcely any other manufacturer had attempted to apply this 'lighting' medium, to any but the most simple processes of culinary art. Numerous workhouses, hospitals, clubs, and private mansions, in London and the provinces, have long since testified to the success of what has ceased to be an experiment, and to the immense saving thus effected in money, time, and general economy in the kitchen. As by no means one of the oldest of Mr. Leoni's triumphs, but certainly one of the most considerable, we will instance Mr. Whiteley's establishment in Westbourne Grove, where about 1,800 persons are fed daily through the agency of his cooking appliances, and are dependent upon them for everything they consume, save bread and beer, even to a drop of hot-water. No breakfast can be obtained until the water in the Leoni boiler is heated, and from which one hundred gallons runs through boiling in twenty minutes. It is self-supplying, consequently throughout the whole day the quantity named is always at command; and Mr. Whiteley states that the first hundred gallons is boiled at a cost of about fourpence. The boiler is formed of a series of small ones, holding about three gallons each, enclosed in a casing, around all which the heat circulates. Each boiler can be readily opened and cleaned as occasion requires, and it is probably the most complete apparatus of its kind in use. Although originally invented by Mr. Leoni for Mr. Whiteley, the maker has since made it a stock article, and is prepared to supply the same model to the public. What is most likely to attract the attention of the visitor to Mr. Whiteley's kitchen is the comparative coolness in the apartment, and the absence of the usual smells inseparable from coal fire cooking. Ventilation is provided for by a series of louvres over the apparatus which draw in the heated air and discharge it into an ordinary flue pipe with the products of combustion. Mr. Whiteley himself states that he has effected a saving of more

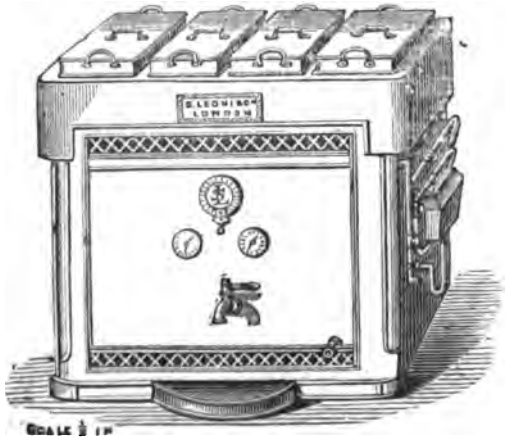
than £800 per annum since he has adopted this system, and as a further proof of the uninterrupted success attending it, we are informed not a single hitch has occurred during the whole period it has been in use, now over five years. Turning to an establishment of a different character; we will instance the Lambeth Infirmary, where a similar apparatus is in use, providing from six hundred to eight hundred inmates with their daily food. As may be supposed, some of the utensils here are of a different character, the requirements of a hospital necessitating the use of some articles distinct from those of a domestic establishment. Amongst the arrangements here, we find large steaming apparatus making fifty gallons of beef-tea daily, and other foods suitable for the sick, but all working with the same order and regularity, absence of undue heat, and extreme cleanliness, and the same high meed of praise is also accorded to the inventor. It may, however, be objected that the examples we have named do not apply to high-class cooking and those choice and cunningly devised *entrées*, that are only to be found upon the tables of the wealthy. An inquiry at some of the clubs, Boodle's, or the Hurlingham for instance, or at many aristocratic mansions, will quickly dispel any doubt that may linger in the minds of the sceptical on this point. The most complete apparatus of this class with which we are acquainted is fitted up in the town house of one of our most wealthy commoners, a gentleman well-known in connection with our Indian Empire. Here there are two *chefs*, one being an Indian, and it is probable that some of the most *recherché* dishes that ever appeared on a dinner-table have been prepared, as regards the cooking, by Leoni's stoves. The frying of white-bait, braising, and the cooking of dishes *au gratin* are arranged for by specially constructed burners, giving the proper amount of heat required to effect these delicate processes; and where Mr. Leoni has an advantage over his competitors in this portion of the work

is, that, having specially prepared and educated himself by constant intercommunication with the most eminent *chefs*, he has become almost a practical cook as well as a gas engineer. But although unapproached in the large and costly apparatus, he is nevertheless a maker of all kinds of stoves suitable for small families, and has always been noted for turning out the very best description of work. Our first illustration represents one of the large double ovens or roasters, with ventilating arrangement above, such as are in use at Mr. Whiteley's



and some of the hospitals, etc. The apparatus is about six feet high, exclusive of the ventilator, and a fair estimate may be formed of the number of joints that can be cooked in it at one time. An arrangement is provided by which the dripping percolates into a well or tank, and is removed from the front. The next engraving is a representation of a patent hot-plate for *entrées* and high-class cooking, with reflector grillers underneath. They are made in several sizes, our illustration being taken from one about five feet long. Steaming apparatus we illustrate by an engraving of Leoni's patent Multiple Gas Boiler, with steamer, intended for fish, poultry, vegetables, etc. Both of these are made of various designs and sizes, regulated by requirements. Our last engraving represents one of the Family Cookers, large enough for the requirements of a family of twenty persons, but is also made in smaller sizes. Descriptions of Mr. Leoni's heating stoves, gas hot-water system, and disinfecting apparatus will be given in a future number of the SANITARY RECORD. If we

were to add up the number of individuals who are daily provided for in the metropolis alone by means



of Leoni's apparatus, and to calculate the number of coal fires required for the same amount of work, we

should find that irrespective of economy, Mr. Leoni has contributed more to the abatement of smoke than any manufacturer now living.

The Urban Sanitary Authorities of Newbury have received the report of Messrs. Law and Chatterton, civil engineers, of Westminster, on the several schemes for the drainage of the district, and acting upon their suggestion have awarded the first premium of 100 guineas to Mr. H. O. Baldry, a member of Mr. Fowler's staff engaged in superintending the construction of the Didcot, Newbury, and Southampton Junction Railway. The second premium of 50 guineas was awarded to Messrs. Gotto and Beesley, of Great George Street, Westminster.

A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 332.)

AIR.—XXXIX.

Disinfection by Hot Air, etc. (continued).—In the last article, I furnished the reader with a perspective view and description of the 'Nottingham Self-regulating Improved Disinfecting Apparatus' of Messrs. Goddard & Massey. I now furnish a series of plans, showing the most approved kind of building for containing it, and for working it in.

FIG. 4.

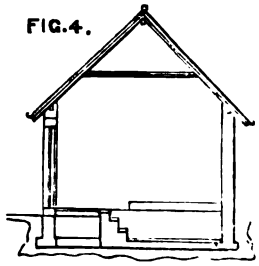
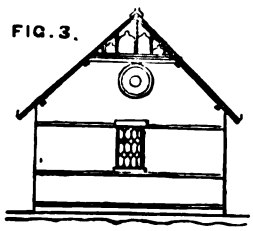


FIG. 3.



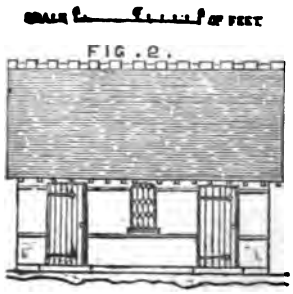
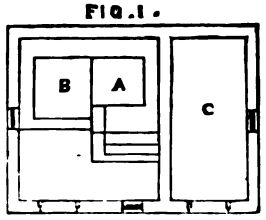


FIG. 1.



Disinfecting Building.
A. Furnace. B. Hot chamber. C. Stores, etc.
Fig. 1. Plan. Fig. 2. Elevation.
Fig. 3. Section through stores.
Fig. 4. Section through disinfecting room.

This building is here given to scale, and is drawn from one in use at a College in the Northern Counties, where it has done excellent work. The furnace, with the gas-ring burner underneath, is situated in a kind of stoke-hole, some four or five steps down below the level of the ground-floor, and the hot chamber is consequently above it (see woodcut, page 332, March 15). The building is formed with brick walls and with tiled roof, and a third of the space covered by the latter is appropriated to the storage of goods requiring disinfection.

In these buildings there should always be tiled floors, and, if possible, tiled walls as well, in order to be able to cleanse it out efficiently. The ceiling should not be of an open character, displaying tie-beams or roof-timbers, at all events in that portion of the building in which the disinfection is carried on. Neither should there be any shelves or cupboards of any kind in either division of the building, as these are apt to harbour deleterious particles of dust, disease germs, vermin, and the like.

The latest portable disinfecting apparatus introduced to the notice of public and private authorities is that invented last year by Mr. Washington Lyon of Cornhill, London. Here, the body of the apparatus consists of a chamber of wrought-iron or other suitable metal, and provided with a door so arranged as to close in a steam-tight manner. Steam

is conducted from the steam-space of a high-pressure boiler into the interior of the said chamber by means of pipes, which open into the lower part of the chamber. This chamber, which may be termed the 'inner chamber', is contained within an outer chamber in such a manner that a steam space exists between the interior and the exterior, suitable supports being provided for maintaining the inner chamber in its proper position. The outer chamber is provided with a door corresponding in position to that of the inner chamber, and pipes are suitably arranged for the purpose of conducting steam to the space between the two chambers. Both chambers are provided with pipes for conducting off any water resulting from the condensation of the steam, and also for facilitating when desired the escape of the steam. On the upper part of the apparatus safety-valves, steam-gauges, and thermometer are fixed for the purpose of ascertaining the temperature of the interior, and for retaining it.

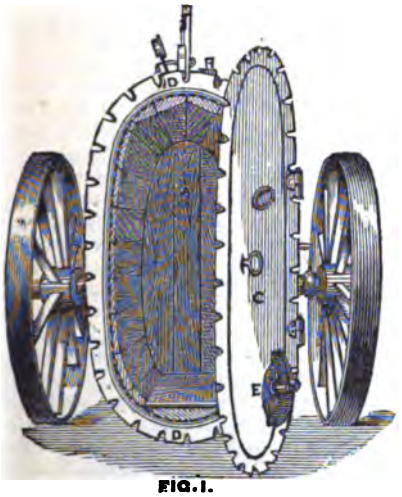


FIG. 1.

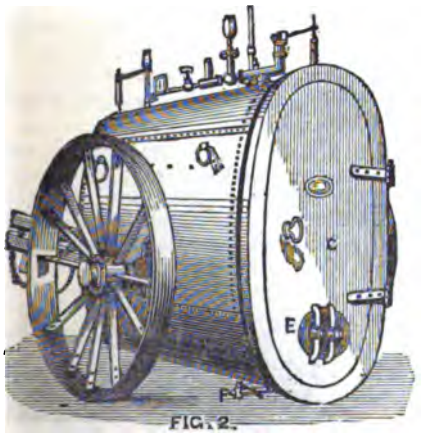


FIG. 2.

Washington Lyon's Apparatus for Purifying and Disinfecting.

A. Inner chamber. B. Casing enclosing outer chamber. C. Door. E. Aperture for introducing small articles into the inner chamber without opening the door. F. Valve for escape of condensed water.

When required for use, the steam being applied, the wearing apparel, bedding, articles of furniture, or whatever is wished to be operated upon is arranged on a perforated shelf, or in a suitable manner, within the interior of the inner chamber. The doors are then closed, and steam is admitted into the said chamber, and is thus brought into contact with the article under treatment, which is allowed to remain exposed to the action of the same until the desired object is effected. In order to prevent the too rapid condensation of the steam within the inner chamber, steam is admitted into the space between the two chambers by preference a short time before the admission of steam to the inner chamber, so that the latter is heated and prepared for its reception.

When the apparatus is to be employed for drying articles or for any purpose where a dry heat is required, or for airing clothing or bedding, for instance, steam is only introduced into the space between the two chambers, and the articles to be operated upon, which are deposited within the inner chamber, are, therefore, not exposed to the moist steam.

This apparatus, as will be noticed, therefore, not only disinfects, but drys and heats as well, according to the wish of the operator.

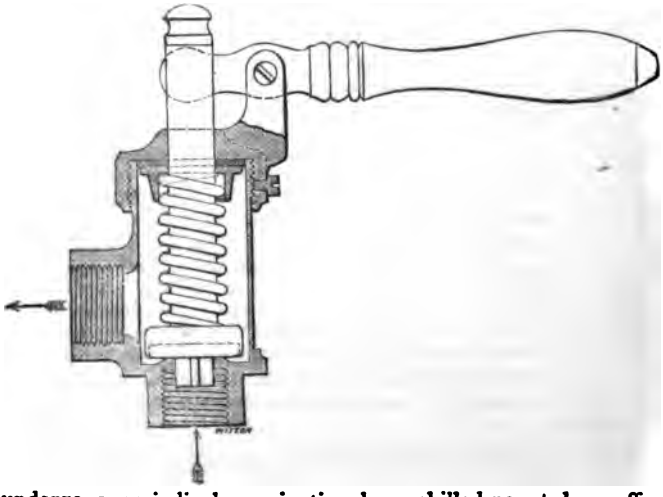
BOILER EXPLOSIONS AND THE FREEZING OF WATER PIPES.

IN our issue of Feb. 15th, we referred to this important question, both in a leading article, and by a descripton of an invention intended to guard against the explosion of kitchen boilers, but the subject was by no means exhausted, and may require more space than we can at present devote to it ere we can place before our readers such inventions, or other expedients that may occur to us, as likely to be useful in preventing the dreadful accidents that periodically occur, and we fear, unless some stringent means are adopted to stay them, will yearly increase. This journal would, as a matter of course, be the last to raise objections to any improvement in the dwellings of the great mass of the people, and a bath-room in the house is to thousands of families to whom it has hitherto been denied, not only a luxury but a positive gain, in time, economy, and health. We must, however, pause, ere we recommend these appliances to those for whom they are now being provided if they are to be employed at constant danger to life or limb from improper construction or ignorance on the part of the people who have to use them. The recent introduction of cheap cast-iron baths now being made at the Scotch foundries, the low prices, caused partly by excessive competition, at which water-pipes are supplied, coupled with the desire on the part of the speculative builder to make his houses as attractive as possible to the tenant, all these considerations have caused him to build a so-called 'bath-room', in tenements whose rents are not much higher than would be paid by a mechanic for his residence. We could point to suburban districts where whole rows of houses, that are let as low as £35 per annum, are provided with a bath-room. If we consider for a moment the class of people who inhabit these tenements, and the indifference as to after consequences on the part of those who erect them, we may really say that, in signing agreements to rent them, they are almost signing their death-warrants. The city clerk, or man engaged in some occupation in the 'city', away from home all day, has but little technical knowledge, and, if he has, the danger has probably taken place in his absence; his wife has still less, and, as for the domestic in charge, probably none at all.

During the last severe frost, thousands of homes in the London districts have had their water-pipes frozen and burst, and many have experienced boiler

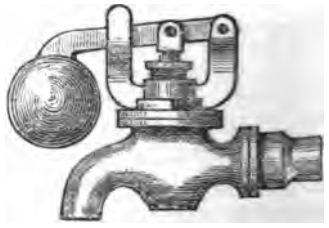
explosions into the bargain, with injury to boot; all of which might have been prevented with better construction, a simple safeguard, or the exercise of a little common sense. In offering suggestions on this important question, we must do it in a broad sense, with a view of dealing with such houses to which we have called attention, as well as to those where the arrangements are presumably well carried out. Although boiler explosions occur to the greatest extent in frosty weather, we have to guard against them all the year round, as they may take place from the accidental stoppage of pipes at any moment. The exposed position of the great bulk of our water-cisterns, and often times of pipes leading from them, is an important factor in causing the freezing, and points to the necessity of a better provision in this direction; but, until a radical change is made, we must take things as we find them, and endeavour to reduce the danger to a minimum. All authorities agree that every kitchen-boiler used as a means of supplying hot water to a bath-room should be fitted with a small reliable safety-valve; and we cannot but express our surprise that this very necessary adjunct has heretofore so often been neglected. There are no doubt numbers of these little appliances adapted to a small boiler made by different engineering firms, but we can at present only mention those that have recently been brought under our notice.

In a very interesting pamphlet recently published by Mr. Samuel B. Goslin, F.M.S., etc., of Messrs. J. Warner and Sons, Crescent Foundry, Cripplegate, London, the old established bell- and brass-founders, the subject is exhaustively treated, and the work should be read by all those who are contemplating the fitting up of hot water apparatus in their houses. From Mr. Goslin's position as an hydraulic engineer of many years' experience, he speaks with authority upon a subject in which he is well versed, and he points out clearly and tersely the danger in which all those persons are living who, having the luxury of hot water laid on over their houses, neglect this simple means of safety to themselves and those around them. He makes one very pertinent suggestion, viz., 'That kitchen-boilers, as in the case of boilers for steam-engines, should



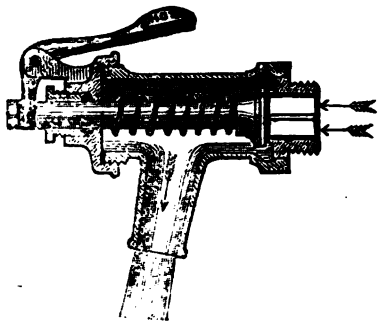
undergo a periodical examination by a skilled person, either once in six or twelve months, to discover their condition', which may be done by paying an annual fee; if the owner of these appliances will not voluntarily adopt such a precautionary measure for his own security, the sooner the legislature steps in and makes it compulsory the better for all concerned. After stating what he considers the necessary means to be observed in the erecting of hot water apparatus, Mr. Goslin proceeds to say, 'And in every case, whether the preceeding can be so arranged or carried out or not, by having a safety valve, which can be easily adjusted, easily seen, easily taken apart and fixed, sensitive to slight variations of pressure, and not easily choked up by soot or corrosion, or rendered useless and inoperative'. Such a safety valve is that invented some time since by W. Randall, Esq., C.E., of Belsize Park, Hampstead, after a kitchen-boiler explosion at his own residence, and of which we give a sectional illustration. Mr. Goslin's pamphlet contains several drawings, showing how the valve can be affixed to boilers of different shapes—being made of various forms according to the exigencies of the case. The one illustrated is intended to be fixed near the boiler, and to be used as a test as well as a safety valve; the handle being pressed down when the fire is lighted will show if steam is being generated instead of the boiler being fully charged with water. The same valve is made with a tap to be fixed to the boiler itself, or to a pipe in connection with it, and is then used as the ordinary hot water draw-off cock for domestic purposes. The valve would thus be opened several times during the day, and could not stick fast, as some do, through rarely being brought into use. The tendency to stick, or 'set', is additionally guarded against by the face of the valve being of vulcanite, which cannot corrode, and will stand the action of hot water or steam for years without deterioration. The spiral brass spring (which does not waste by rust or heat) when screwed down to the utmost, balances the pressure exerted on the boiler by the water in the circulating pipes in houses from 60 to 70 feet high. For those of less height, in fixing the tap the workman has merely to unscrew the tap until the water issues from the side aperture, and to screw it down again until it ceases to run (but not further), and then to tighten up the small set screw. For small houses, or in the hands of careless or ignorant persons, we should certainly recommend the valve and tap, as presenting the greatest safeguard against all possible danger.

Messrs. J. G. Stidder & Co., the sanitary and builders' engineers, 50, Southwark Bridge Road, are patentees and makers of three simple but effective safety-valves for kitchen boilers, either of which



appears equally applicable to the object in view. The first of our illustrations represents a dead weight safety-valve and draw-off cock combined. This is made with an index on the top of the lever, showing in feet the head of water at command. Under ordinary circumstances, it is sent out regulated to thirty

pounds pressure, or it can easily be altered, and so weighted to resist any pressure to meet the requirements of heavy columns of water passing from the cistern to the boiler. It is self-closing, and not liable to get out of order, and by pressing the lever upwards, water can be drawn off. This cock is made of the best yellow brass, the ball-weight being of iron. The next engraving is a sectional view of a draw-off and spring regulating valve No. 687, which is a neatly made and attractive looking article, and, like its companions, possesses great strength, being also



self-closing. It acts for drawing off water when the lever is pressed down, and closes immediately the hand is withdrawn. This is also capable of withstanding the very highest pressure ever likely to be brought to bear upon such an article, and is entirely automatic as a safety-valve. Our last illustration is a spring safety and regulating valve, similar in its internal arrangements to No. 687, but without the draw-off cock. This can be fixed either on the boiler or on any available part of the pipes applicable to such a purpose. The bottom of the valve is covered with a bed of the very best rubber, the metal being lapped over it at the edge, and the rubber practically indestructible, though a new one can be easily applied should it become necessary. This rests upon an ordinary metal seating, and outside the stem of the valve is coiled a spring made of the best hard-drawn brass wire of the required strength. A nut or flat cap is then screwed into the inside of the outer casing, pierced in the centre for the stem of valve to pass through it, and this is generally set to thirty pounds pressure. A cap covers the whole, with the stem extended about one inch through it, and a row of holes around the outside for the escape of steam completes its arrangements. Should it be required to resist a heavier pressure than thirty pounds, the top cap has only to be taken off and the inner one screwed down lower. It appears to us that either of the appliances we have described are admirably suited for the purpose for which they are made, and we understand an increasing demand has set in for them since the late unfortunate accidents took place.

(*To be continued.*)

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap, 6d. tablets.—(Advt.)

THE

SANITARY RECORD.

APRIL 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

ADULTERATION IN AMERICA.

THE Bill brought forward in Congress by the National Board of Health (see page 366) as an efficient measure for repressing adulteration is being opposed by the action of Committee on Epidemic Diseases appointed by the House. This Committee form an opinion that adulteration in the States is so rife, that a Bill such as that introduced would not meet the matter; that even a Committee of Congress could not alter it sufficiently to render it effective; and therefore with singular lack of reason they propose to form a Committee of Experts, who are to examine into the whole subject—to do over again, in fact, what our hundred and fifty public analysts have been doing in this country in the last five years—and to do all this in an aimless and useless way, because no prosecution could ensue, and the frauds would still go on.

In one sense this is only an attempt to postpone the matter *sine die*, but in other ways it seems to point to prohibiting legislation.

It is impossible yet to draw a hard and fast line as to food purity, and if such an attempt is made in the United States, an error will be committed as great as that in the recently passed Swedish Acts, where page after page of schedules of prohibited admixtures, and prohibited colours and prohibited trades will, if the law is enforced, cripple much legitimate food trade. And yet so weakly are these interminable schedules drawn, that admixture with the poisonous salts of mercury is not referred to, and some of the most objectionable salts of copper are overlooked.

It would be far better to accept the Bill which English experience has shown will practically meet the evil, and stop all injury to health and nearly all fraud on the consumer's pocket, than to allow the present state of things to continue for a year or more longer.

One of the principal movers in this matter is Mr. G. T. Angell of Boston, who presents in the report he hands in, a highly coloured and sensational picture of his experience of Boston foods. For instances, two must suffice. He says cheese is adulterated with potatoes, beans, oleomargarine, vermillion, red chalk, sulphate of copper, arsenic, and corrosive sublimate, and that seven-eighths of the sugars sold in Chicago are adulterated.

It is a mercy we live in England where such

things are not sold. We sincerely hope Mr. Angell is not a candidate for an appointment on the commission, for with such a state of things he would be poisoned before his labours had lasted long enough to be of any utility.

THE REPORT OF THE MEDICAL OFFICER OF THE LOCAL GOVERNMENT BOARD.

THE annual blue-book containing the report of the Medical Officer of the Local Government Board for 1879 has only just been issued, though there does not appear, from the internal evidence of the report, any reason why it should not have been published at least six months ago. Its interest is now to a large extent historical only, since the papers it contains have almost all appeared already in another form. The only contributions that can be looked upon as absolutely new are a report by Dr. Cory (the principal Vaccinator of the National Vaccine Establishment) on his results with Dr. Warlomont's animal lymph; a paper by Dr. Bastian on the natural history of the parasite found in the body of a boy who died on board the school-ship *Cornwall;* and an elaborate monograph by Dr. Klein on the lymphatic system of the skin and mucous membranes. Dr. Cory's report needs no comment, and Dr. Klein's researches are too recondite to require criticism here. Dr. Bastian's report, on the other hand, touches a matter of much practical importance.

It may be recollected that a remarkable outbreak of fever on board the school-ship *Cornwall* was some time ago enquired into by Mr. W. H. Power, who was able to disprove its identity with enteric fever, and regarded it as trichinosis (see SANITARY RECORD, p. 338 of volume xi). Dr. Bastian, however, who has examined the parasite from a helminthological point of view, has discovered in it points of dissimilarity from trichina, and refers it to the genus *Pelodera*, which has not heretofore been known to invade the human body.

This decision of Dr. Bastian doubtless explains the puzzling denials which have of late been made by Mr. Mundella and Mr. Dodson that there had been any outbreak of trichinosis in this country—the *Cornwall* outbreak being, in fact, not as Mr. Power supposed, one of that disease, but one of what Dr. Bastian names Peloderiasis. The immediate practical importance of the question lies in the fact that if these worms did actually cause the malady on board the *Cornwall*, we shall have in future to distinguish between two distinct fleshworm diseases in the human subject, the one caused by the Trichina fleshworm, and the other by the Pelodera fleshworm.

The mode in which worms of the latter class, or their allies, gain entry to the body is not yet determined; but the eating of raw fruits or vegetables contaminated with such organisms, or with minute slugs that may have swallowed them, in addition to the drinking of unfiltered and unboiled water which may for some time have been stored in tanks or cisterns containing much organic sediment, are possible modes by which dwellers in towns or other communities might be infected. The young or the ova of particular free nematoids might, from time to time, chance to be brought to such reservoirs in unusual numbers, and they might there find conditions favourable for their still further multiplication; and if disease in man does not often result from such causes, this is, in Dr. Bastian's view, probably to be ascribed to the general inaptitude of these free nematoids to take on this kind of accidental parasitic existence rather than to the rarity with which they or their ova are able to gain access to the human alimentary canal.

STRUCTURAL WORKS.

A DECISION has just been given in the Court of Exchequer which though not perhaps capable of being impeached as a matter of law, will nevertheless be found greatly to hinder the operations of Local Authorities and their officers minded to bestir themselves to bring about the removal of nuisances.

In the case of *Whitchurch* v. *Justices of Nottingham*, (see page 388), the point raised was in itself a simple one, but it gave rise to a great deal of argument, and will have we fear, mischievous consequences. The facts seem to have been as follows:—One Whitchurch, being the owner of a house with a privy and ash-pit which had become offensive, had served upon him by the Town Council a notice under section 94 of the Public Health Act, 1875, requiring him to abate the nuisance in a certain specific way, viz., by filling up the ash-pit, and by abandoning the privy, and substituting a proper and sufficient pail-closet. Whitchurch failed to obey this notice, and was in consequence summoned before the magistrates, who made an order that he should comply with the requirements of the Town Council, by executing the works required. Whitchurch feeling aggrieved by this decision of the magistrates sought, and successfully, the intervention of a superior Court, which at his instance quashed the order as *ultra vires*. The judges in their decision took the very precise, or as some might feel inclined to say, the very narrow ground that the statute only made it the duty of the defaulting house-owner to do such works as were 'necessary'. This of course is true, but it leaves open the very troublesome point as to who is to decide locally when disputes arise on the meaning to be attached to the word 'necessary'. Mr. Justice Stephen enunciated his view with characteristic plainness as follows:—'I cannot say that those words, putting upon them a grammatical construction, and having regard to the other provisions of the Act, are in any way equivalent to "such works as the Local Sanitary Authority shall consider necessary"'. Mr. Justice Stephen did not, however, state the unavoidable corollary to this *dictum* of his, viz., that the offender is to decide for himself how he shall

punish himself, for that is what it comes to. We are not wishing for one moment to say that the narrow interpretation thus put upon section 94 of the Public Health Act is incorrect, but we do say that the decision is excessively unfortunate from the stand-point of the Sanitary Reformer, and likely to serve as a powerful encouragement to obstructive owners of defective houses, to resist obstinately all endeavours by Local Authorities to improve the sanitary condition of the houses under their jurisdiction.

Apart from the points of law involved in what we have said above, the arguments which took place in the Court of Exchequer suggest the desirability of amending and improving the procedure of the Public Health Act with respect to nuisances. Counsel who appeared for Whitchurch seemed to insinuate that if the Local Authority had proceeded under section 36, it might have been able to enforce its wishes with respect to the closet sought to be erected. Possibly this is so, but the fact still remains that it is a great blot on the group of sections of the Public Health Act, 1875, (91-111) which concern nuisances, that they should be so loosely framed as to thwart a Local Authority desirous of substituting a definite remedy, generally for the unquestionable evils attendant on the existence of privies in towns.

It is too large a subject to discuss at the termination of an article, but there can be no doubt that the Public Health Act, 1875, urgently stands in need of extensive reconstruction and expansion in many of those parts which relate to the practical working of the Act. The fact is, that the statute in question was not only drafted in a very slovenly fashion, but was the outcome of a very timid and irresolute policy. Hence the lack of boldness and vigour visible in so many parts of it.

NOTES OF THE MONTH.

THE VENTILATION OF DWELLING ROOMS.

Mr. E. Ingress Bell, in a paper on this subject, published in the *British Architect* for March 11th, states that like other architects, he has from time to time tried his hand at that ever recurring problem, the draughtless ventilation of dwelling-rooms of moderate dimensions, *i.e.*, 24 feet by 18 feet 'a little more or less', as the lawyers say. After some deliberation, he determined to adopt a modification of the vertical inlet-tube plan, bringing his vertical air ducts in the jambs of the fire-place, raising the mantel to a suitable height, in the fashionable style, and providing at the top of the air-shaft a horizontal hit-and-miss grating flush with the shelf. These air ducts he made of zinc, to lessen friction, six inches by four inches with an elbow, at about the skirting level, leading through perforated terra-cotta panels, directly into the open air. In towns, he thinks some strainers of cotton wool, or other material, would have to be used. If the fire-place be not in an outer wall, the tube must be carried under the floor boards, and up again at its outlet, to a height sufficient to prevent the inlet being too near the ground. As to the success of this plan, Mr. Bell testifies to the fact, that in a small drawing-room where he first tried it, thirty-six persons were entertained at a 'small and early,' and finding the room so cool, and the air so sweet, curiosity got the better of them, and they could not control their desire to learn the secret of such an extraordinary state of things. He states, that on ascertaining the means, some amusement was afforded by an endeavour to get where there *was* a draught, for all agreed that there *ought* to be a draught. Placing the hands over the open tubes, it was apparent that volumes of air were entering the room at a high velocity. But no draught was elsewhere perceptible. The only exit provided for the respired and vitiated air was the chimney flue, and this proved equal to all demands upon it. No outlets near the ceiling are required to remove the vitiated air. The air never stagnates, so brisk is the circulation in up the tubes and out up the chimney.

BOSTON (U.S.) WATER.

From a recent report made by Mr. J. F. Babcock, it appears that the Cochituate water delivered to the City of Boston is very unsatisfactory in character.

The total solid matter is		4.83	grains per gallon.
Matter volatile on ignition,		1.82	,, ,,
Mineral matter	..	3.01	,, ,,

So far the only noticeable point is the very high ratio of volatile to mineral matter. But the albumenoid ammonia is reported to be .0240 grain per gallon. This, combined with the disagreeable taste and appearance of the water, clearly indicates heavy organic contamination, most probably from gathering grounds charged with peaty matter or decomposing vegetable fibre. Such waters are unpleasant to the sight, disagreeable to taste, and very likely to produce illness in those accustomed to more calcareous waters. We ought, however, to call the attention of American analysts to the meagre character of the information usually given in their reports. It is a very rare thing to find a water analysis from the States which gives more than a mere outline of the proper analytical results. Take the present case as an illustration. The nitrates and chlorine are of great moment in forming an estimate of a contaminated water, but the data are not given. Perhaps some stimulus may be produced in this direction by the large number of complete analyses of English waters which have been published here during the last few years. The comparison of samples from the virgin soil of America would have special interest as against those from our densely populated country.

THE ATMOSPHERE OF MANUFACTURING TOWNS.

Dr. Angus Smith, F.R.S., the Inspector under the Alkali Acts, has presented to Parliament a voluminous report. The professor believes that he has discovered 'a new mode of analysing the atmospheric conditions under which we live in manufacturing towns'. He expects in this way to show 'how much a town or a county suffers by loss of light, and to find how much this loss affects health of plants, and it may be of animals and of man'. The test is a chemical one, and rests upon the fact that when iodide of potassium in solution is treated with a small quantity of nitric acid, a change takes place when the mixture is brought to the light, and the amount of iodine that is set free can be measured with great exactness. This is the germ of a process for measuring light that may be developed in time into a valuable agent for the examination of climate.

H H

The next topic of importance is the universal presence of ammonia, which the inspector has found upon every object he has examined, in-doors and out of doors, in the town and in the country. Ammonia, it is believed, may be an index of decayed matter. By suspending a piece of glass anywhere, and after a while washing the outer surface with pure water by means of a spray bottle, and applying a Nessler solution to the washing, the presence and quantity of ammonia are ascertained. This, Dr. Smith hopes to make 'a ready popular test for air, a test for sewer-gases, for overcrowding, for cleanliness of habitations, and even of furniture, as well as for smoke and all the sources of ammonia'. In the conclusion, the professor speaks of the 'enormous value of the ammonia obtainable from the fifteen millions of coal made now into coke, if the process, said to be so successful at Bessèges, should be found successful here. If we were to treat all the coal used in the country in the same way, we should have above six times as much ammonia, which would be capable of increasing our crops by fifty millions sterling of value.'

INFECTIOUS DISEASE IN THE PORT OF LONDON.

Instructions to the following effect have been issued by the Sanitary Authority for the Port of London, to masters of emigrant ships, in case of infectious diseases occurring on board while in the river Thames. The master of the ship is to communicate forthwith by telegram with Dr. William Collingridge, the Medical Officer of the Port of London, King William Street, Greenwich, and to follow up the telegram by a certificate from the surgeon of the ship; and should such emigrant ship be in any part of the river below Woolwich, he is also to telegraph to the Medical Officer of the hospital ship *Rhin*, off Gravesend, on board which ship the patient must be sent at once. If a case of infectious disease is discovered in an emigrant ship in any part of the river above Woolwich the patient is to be sent in a proper ambulance to the nearest hospital for infectious disease. Under the term 'infectious disease' are included small-pox, typhus, typhoid (enteric) fever, scarlatina, measles, erysipelas, diphtheria, cholera, yellow fever, and plague.

THE NOTIFICATION OF INFECTIOUS DISEASE AT BROOKLYN.

If ever our English Local Government Board should think proper to consider afresh their position with regard to the compulsory notification of infectious disease, the conspicuous success of such a requirement in many American towns will have interest for them. Foremost in this matter amongst sanitary authorities is the Board of Health for the city of Brooklyn, where notification of infectious cases has for some time been in active operation, and where improvements have lately been made in the method of dealing with such notifications. The city has now been divided into a number of convenient districts, for each of which a 'sanitary inspector' (a medical man) has been appointed. Hereafter, each case of infectious disease is to be reported to the inspector of the district in which the case occurs. By this means it is hoped that the isolation of the patient, the proper disinfection of the premises, etc., may be more promptly effected. Post-cards are provided for reporting the cases, and a handy map has been printed showing the area of the different inspection districts. Doubtless Dr. Crane, the Commissioner of Health, is right in thinking that the application of this plan will be more convenient for physicians, and, by affording opportunity for greater promptness of action on the part of the Health Department, will be the means of much more effective sanitary work in the suppression and control of infectious diseases.

ARCHITECTS AND SANITARY SCIENCE.

The Council of the Royal Institute of British Architects have accepted Mr. Ernest Turner's offer to present a silver medal to the candidate in the first Obligatory Examination under bye-law 14, who most distinguishes himself in subjects connected with Sanitary Science.

BOILER EXPLOSIONS.

The chief engineer of the Manchester Steam Users' Association has presented to that body an interesting report on the boiler explosions of the year 1880. With the exception of 1876, when the list of victims was abnormally swollen by the terrible disaster on board H.M.S. Thunderer, more persons were killed during 1880 than in any year on record. In 35 explosions, 95 persons were killed and 107 injured; but more than half of this total was due to two explosions only, in which the killed and wounded numbered respectively 50 and 49. The advantage of a scientific examination of boilers is proved by the fact that no explosion involving large loss of life appears to have occurred among the boilers inspected by the officers of the society. The report urges strongly the necessity for legislative interference for the protection of the public, and the Association has introduced a Bill into Parliament which has for its object to make better provision for inquiries with regard to boiler explosions, so as to secure a searching investigation in the event of every explosion, whether fatal or not, by a court independent of the coroner's, and more competent to deal with the scientific questions.

THE PUBLIC HEALTH
DURING MARCH 1881.

THE mean temperature during March at the Royal Observatory, Greenwich, was 42°.6, and was 1°.7 above the average March temperature in 100 years. Excepting March 1880 when the mean temperature was 44°.3, last month was warmer than the corresponding month of any year since 1874. The mean showed a varying excess on eighteen of the thirty-one days of last month, whereas there was a deficiency of temperature on each of the other thirteen days. The first three days of the month were cold, but a warm period set in on 4th, and lasted uninterruptedly until 20th, inclusive; excepting a slight excess on 24th, the mean was below the average during the remainder of the month. The coldest day of the month was the 1st, when the mean was 31°.9 and 8°.4 below the average. The warmest day was 10th, when the mean was 53°.5, showing an excess of 12°.8. Rain was measured at Greenwich on eleven of the thirty-one days of the month, to the aggregate amount of 1.8 inches, which was slightly in excess of the average March rainfall in sixty-one years. The sun was above the horizon during 366.9 hours of March, and 115.8 hours of bright sunshine were recorded at Greenwich, which, although 25.2 hours less than was recorded in March 1880, ex-

ceeded the average amount in the corresponding month of the four years, 1877-80, by 14.7 hours. The wind was mainly westerly until 26th, when a north-easterly wind set in, and lasted until the end of the month.

In the twenty large English towns dealt with in the Registrar-General's weekly returns, containing a population estimated at more than seven and a-half millions of persons in the middle of this year, or nearly a third of the entire population of England and Wales, 27,404 births, and 16,074 deaths were registered during the five weeks ending 2nd April. The births were equal to an annual rate of 37.5 per 1,000 of the estimated population in the twenty towns, against 33.8, 36.5, and 38.6 in the three preceding months; in March 1880 the birth-rate in these towns was 37.4, and almost identical with that recorded last month. The birth-rate last month was equal to 37.7 in London, and averaged 37.4 in the nineteen large provincial towns; it ranged from 29.2 and 31.7 in Brighton and Plymouth, to 41.5 and 41.9 in Birmingham and Nottingham.

The annual death-rate in the twenty towns during the five weeks of March did not exceed 22.0 per 1,000, against 26.2 and 23.8 in the two preceding months. The March death-rates in those towns in the three years 1878-79-80 were respectively 24.0, 28.2, and 22.3. The death-rate last month, therefore, although differing but slightly from the low rate in March 1880, was very considerably lower than the March rates of either 1878 or 1879. Bearing in mind the exceptionally low temperature that prevailed during a considerable portion of January the English death-rate during the first quarter of this year has been satisfactorily low. The lowest annual rate of mortality in the twenty towns last month was 18.0 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follow: Leicester, 18.7; Birmingham, 19.5; Bradford, 19.6; Sunderland, 20.4; Sheffield, 20.5; Salford, 21.2; Norwich, 21.2; Hull, 21.4; Nottingham, 21.6; Bristol, 21.7; London, 21.8; Newcastle-upon-Tyne, 22.1; Portsmouth, 22.3; Leeds, 22.5; Plymouth, 22.9; Wolverhampton, 23.4; Oldham, 24.5; Manchester, 25.7; and the highest rate during the five weeks was 26 3 in the borough of Liverpool. In the nineteen provincial towns, which have an aggregate population somewhat larger than that of London, the annual death-rate during March averaged 22.2 per 1,000, while in London it did not exceed 21.8, although the fatality of the principal zymotic diseases was there considerably greater than in the provincial towns. The comparatively high death-rates last month in Oldham, Manchester, and Liverpool were not caused by excessive zymotic fatality, but appear to have been in great measure due to high rates of mortality from diseases of the respiratory organs.

The 16,074 deaths from all causes in the twenty towns last month included 1530, or only 9.5 per cent. which were referred to the principal zymotic diseases; of these 377 resulted from whooping cough, 280 from scarlet fever, 264 from small-pox, 220 from measles, 164 from 'fever' (principally enteric), 149 from diarrhœa, and 76 from diphtheria. These 1,530 deaths were equal to an annual rate of 2.1 per 1,000 in the twenty towns during the five weeks under notice, and showed a further slight decline from the zymotic rates prevailing in recent months. The death-rate from these diseases last month was equal to 2.5 per 1,000 in London, while it did not average more than 1.7 in the nineteen provincial towns; it ranged from 0.6 in Brighton and 1.0 both in Plymouth and Hull, to 2.4 in Newcastle-upon-Tyne and Wolverhampton, and 2.8 in Portsmouth. The high zymotic death-rate in Wolverhampton was mainly due to scarlet fever, and in Portsmouth to diphtheria. The 377 deaths from whooping-cough in the twenty towns were equal to an annual rate of 0.51 per 1,000, showing a further decline from the rates 0.65 and 0.55 in the two preceding months; the fatality of this disease was considerably below the average rate for the season, but showed an excess both in Leeds and in Sheffield. The 280 fatal cases of scarlet fever showed a further considerable decline from the rate that prevailed in recent months; the annual death-rate, which had been equal to 0.90, 0.65, and 0.45, in December, January, and February, further declined to 0.38 in March, when the largest proportioned fatality occurred in Sunderland, Bristol, Oldham, and Wolverhampton. Of the 223 deaths from measles in the twenty towns, 175 occurred in London, and only 45 in the nineteen provincial towns, which have a larger aggregate population; even in London, however, the fatality of this disease was considerably below the corrected average for the season. The 164 deaths referred to fever (including typhus, enteric, and simple continued) in the twenty towns were equal to an annual rate of 0.22 per 1,000, and showed a further decline from the rates that had prevailed in the three preceding months, which were 0.27, 0.25, and 0.24, respectively. The fever-rate last month did not exceed 0.21 in London, while it averaged 0.24 in the nineteen towns; the highest death-rates from fever were 0.32 in Leeds, and 0.38 in Portsmouth. The 76 deaths referred to diphtheria in the twenty towns included no less than 44 in London, while but 32 occurred in the nineteen other towns; of the latter, 9 were returned in Portsmouth, 6 in Liverpool, and 4 in Salford. The death-rate from diphtheria was nearly seven times as high in Portsmouth last month as the average rate from this disease in the twenty towns. Small-pox caused 258 more deaths in London, whereas only 6 were registered in the nineteen other towns, of which 2 occurred in Birmingham, 2 in Newcastle-upon-Tyne, and 1 each in Liverpool and Manchester; in the fifteen other towns not a single fatal case of this disease was recorded. The prevalence of small-pox in London showed a further increase during March. The number of small-pox patients in the Metropolitan Asylum Hospitals, which had steadily increased from 105 to 752 during the four preceding months, had further increased during March to 899 on 2nd April. The average weekly number of new cases of small-pox admitted to these hospitals, which had been 20, 53, 97, 115, and 195 in the five preceding months, averaged 210 during the five weeks of March. Small-pox again showed the largest proportional fatality in the south and east groups of Metropolitan registration districts.

The deaths of infants under one year of age during March averaged 135 per 1,000 of the births registered; in the two preceding months of the year the proportion had averaged 149 and 137 per 1,000. Infant mortality in the several towns, measured in this manner, did not exceed 112 and 121 in Norwich and Brighton, whereas it ranged upwards in the other towns to 164 in Manchester, and 165 both in Bradford and Sheffield. Infant mortality was equal to 127 per 1,000 in London, while it averaged 143 in the nineteen provincial towns.

The fatality of the diseases of the respiratory organs showed a considerable further decline during March. The average weekly number of deaths re-

ferred to these diseases in London, which had been 513 and 436 in January and February, further fell to 371 during the five weeks of March, and were no less than 95 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London, during March, was equal to 5.2 per 1,000, against 7.2 and 6.1 in January and February; in Liverpool and Salford the death-rate from the same diseases last month was equal to 6.3 and 7.5 per 1,000.

In the outer ring of suburban districts around London, having a population of little less than a million persons, the annual death-rate from all causes during March did not exceed 15.7 per 1,000, against 18.9 and 17.4 in the two preceding months; the death-rate from the principal zymotic diseases in suburban London was equal to 1.4 per 1,000, against 1.8 and 1.15 in January and February. The death-rates from all causes, and from the principal zymotic diseases within registration London during last month was, as before stated, 21.8 and 2.5 per 1,000 respectively, showing a proportionate excess, compared with the rates in the suburban districts, very similar to that usually noted.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on March 18th, Dr. Bristowe, President, in the chair. The Council brought up a report recommending that Mrs. Johnstone's offer to arrange for the supply of nurses, under the control of the Metropolitan Medical Officers of Health, be not accepted. The Council also reported the result of their conference with Drs. Gladstone and Richardson, on behalf of the School Board of London, respecting the regulations necessary to prevent the spread of infectious diseases amongst the school children. The Council were empowered to draw up the necessary regulations, and submit them to the Society at their next meeting. It was also stated that the Committee on Trade and House Refuse would make their report to the next meeting, and it was requested that the reference should include stable and cow refuse. Agreed to. Mr. R. Tuson of the Royal Veterinary College, was nominated as an Associate.

Dr. DUDFIELD brought forward his resolutions respecting (1) the compulsory registration of infectious diseases; (2) a proposed amendment of the 26th Section of the Sanitary Act; and (3) depauperization by medical relief. He said that the Society of Medical Officers of Health was amongst quite the earliest workers, having had an interview with Mr. Goschen in 1876, and again at a later date with Mr. Sclater-Booth, advocating the compulsory notification of infectious diseases. He referred to the Acts of Parliament obtained by Huddersfield and other boroughs in which clauses empowering the local authorities to enforce this, and to several bills now before Parliament asking for the same. Also, that the Parliamentary Bills Committee of the British Medical Association and the Social Science Association were in favour of it. The second matter he had to bring before the Society, viz., an alteration in the Sanitary Act and Amendment Act of such a kind as would enable local authorities to remove patients afflicted with infectious diseases whenever removal was necessary to prevent the spread of infection. At present it is considered that a person can be removed only when members of two families occupy the same room, or the patient is without proper lodging and accommodation for himself. 3. He thought that every person not capable of being treated at home with safety to himself and others should be removed at the expense of the local authority, and no charge be made for his removal or treatment. He thought it singular that human life should not be protected, when animals with infectious diseases are isolated or killed. He was strongly of opinion that the Society's recommendations on these points should be carried out, as well as the last, including the resolution that a central board should be formed for all London, completely dissevered from pauperism. As regards the person to give the notification of the existence of infectious disease, he agreed that it should be the occupier of the house. He concluded by moving formal resolutions embodying these principles, and also (4) that the Council be empowered to bring the resolutions before the Local Government Board.—Dr. CORNER of Mile End, and Dr. LONGSTAFF spoke in favour of the resolutions.—Dr. TRIPE said he was not opposed to the resolutions, but thought it was scarcely the time to ask the President of the Local Government Board to enforce compulsory registration of infectious diseases when the conditions under which hospitals for the reception of these diseases can be built and conducted are so doubtful as at present.—The propositions having been put to the meeting, were carried unanimously.—Dr. TRIPE then said that his chief reason for bringing to the notice of the Society the present condition of affairs as regards hospitals for infectious diseases was the decision against the Metropolitan Asylums Board in the Hampstead Hospital case. The House of Lords had decided that the Asylums Board has no statutory powers to erect and maintain such hospitals, or were unable to exercise any functions which would interfere with a man's private rights, and there was no space defined within which the establishment of such an asylum was made lawful. This being the state of the case as regards the Metropolitan Asylums Board, *a fortiori* it is so as regards local sanitary authorities, and he, therefore, supposed that no hospital for these cases would be erected by them for the reception of small-pox, etc. This is a serious state of things, as in his district numerous instances had occurred of the disease spreading not only to all the other members of the families primarily attacked, but to the adjoining neighbourhood, in consequence of concealment of cases, and consequent non-removal to hospitals. He then quoted the sections of the Act of Parliament bearing on this subject, pointed out that with increased powers and limited immunity from legal proceedings these hospitals might be conducted so as to be of the greatest public benefit, especially if there were a hospital for each borough in London, and concluded by moving that the subject be referred to the Council for consideration and report, with the object of forming a deputation to the Local Government Board.—Dr. DUDFIELD seconded the resolution, which was carried unanimously.

Dr. Bakewell's paper on 'Some Colonial Sanitary Lessons' was then read. He said that so far as he had seen, the rate of mortality had not been diminished by sanitary measures, which led to the belief that sanitary authorities have not taken the best steps to limit infectious diseases, or prevent their

fatality. He believed, however, that although good drainage will not diminish the number of infectious diseases, that it would of phthisis, especially if good diet be afforded, and overwork avoided. He said that the largest proportion of the adult New Zealand population is European, who work as a rule for eight hours a day, and generally obtain a liberal diet, often eating too much meat and too little fruit and vegetables. He had not seen much of strumous diseases except phthisis in large towns, whilst he found diphtheria decidedly frequent. Scarlet fever was occasionally severe, but generally was mild; indeed, he had attended in one locality 300 consecutive cases without a death. In Dunedin it was very fatal, which, he thought, might be partly accounted for by the large quantity of meat eaten by the whole population. Overcrowding also existed, which was rendered more injurious by the bedrooms being shut up. In the country the sanitary arrangements are bad, cesspools being often made near to the wells, but there is little struggle for existence, and the population is becoming inert and languid, although healthy. This is more especially the case in the cities, in which, however, the children are not so healthy, owing to the amount of work at school, where the hours are too long, and the subjects taught too many. As the country-born boy liked to be brought up to some genteel employment, and objected to manual labour, which is chiefly performed by emigrants, he feared that the inhabitants will speedily degenerate. He gave some instances of very low death-rates, especially mentioning Watucha, where the annual mortality at all ages was only 5.2 per 1.000 population during the time he was there.—Dr. TRIPE said that the statistics he had seen as regards New Zealand certainly did not correspond with those given by Dr. Bakewell, which statement was supported by Dr. BROWNING, who had passed many years in the country. The meeting then adjourned.

EXHIBITION OF LABOUR-SAVING APPLIANCES.

THIS exhibition, held at the Agricultural Hall, Islington, drew together a goodly array of exhibitors whose manufactures bear directly on the subjects sought to be illustrated, as well as others the connection of which with labour-saving appliances it would require rather a stretch of the imagination to understand. If we, however, found articles of a character rather incongruous with those for which the exhibition was ostensibly set on foot, Mr. Messent, the promoter, a gentleman whose name is well known in connection with certain trade publications, must be complimented on the excellent display he has got together, and should he decide to continue it as an annual exhibition, we hope it may grow with each successive display. Starting with requisites for the basement of the dwelling, we found specimens of anthracite coal, from the Gwann-cae-Gurwen Colliery Co., Limited, Spring Street, Paddington, which was burnt in some of the stoves exhibited, and Mr. Harry Hunt of Newington Green Road, N., the sole agent for Norris's anthracite, was burning this fine vein of smokeless fuel in his Crown Jewel stoves, described in the SANITARY RECORD of Dec. 15, 1880. Taking stoves as next in order, we found a goodly array, including gas cooking and heating, and those for burning coke and coal. Amongst the former we may mention the Leeds gas cooker (Messrs. Beverley and Wylde, Leeds), exhibited by Messrs. Browne and Co., Piccadilly; Messrs. Ritchie and Co., St. Swithin's Lane; the Peckham Gas-burner Co.; and a variety of small stoves and other useful gas appliances sent by the 'Sanitary and Domestic Appliances Co.', Exchange Arcade, Deansgate, Manchester. In slow combustion stoves, Mr. Charles Portway of Halstead, Essex, was present with an attractive assortment of his 'Tortoise' stoves, of which a full description was given in the SANITARY RECORD of Feb. 15. Messrs. Brown and Green, of Luton and Bishopsgate Street, had an imposing array of their 'Dwarf' and 'Albion' stoves of a similar character, and their 'Gem' and other portable cooking stoves and kitcheners. The Wilson Engineering Company were well to the fore with their patent ranges, which we have described in our issue of Aug. 15, 1880, and a new firm of aspirants for Metropolitan honours were present in the persons of Messrs. D. and T. Robertson, Sauchiehall Street, Glasgow, and 120, Cheapside, who showed some large handsome self-setting ranges, that are said to consume a large portion of their smoke. We propose giving a fuller description of these inventions in a future number. The same firm exhibited a large assortment of Robertson's 'Napierian' coffee machines. Another firm whose manufactures deserve a more lengthened description than we can here afford them, and which will appear in the notices we propose giving in consecutive numbers of the SANITARY RECORD on stoves and ranges, is the Eagle Range Company of Lozells, Birmingham, and Fleet Street, whose kitchen ranges, grillers, etc., showed well amongst all their competitors; and the Sunlight Cooking Stove Company of Blackfriars Street, Manchester, who for the first time exhibited a hot-water apparatus in connection with these stoves for supplying bath rooms, etc., of a simple and effective character, tending to the prevention of explosions. As we purpose to publish a series of articles on this important question, a full description of the arrangement will appear in them.

Washing, mangling and wringing machinery, formed an important feature in the exhibition, the largest display being that of Messrs. Thomas and Taylor, of Stockport and London, who exhibited a steam laundry and a number of their hand-power Eccentric washing machines, besides mangles and wringers. The firm are also noted for butter churns and dairy utensils, being 'Royal' prize holders for their Eccentric churn, of which there are a large number in use. Messrs. Wood and Parkinson of Throstle Grove, Stockport, showed to advantage in mangles and wringers, being patentees of the 'Duplex' mangle made with three rollers, which greatly economises time and labour, wringers made on the same principle, and a simple and ingenious little washing machine, made to fix upon a tub, called the 'Segment' washer, which is very effective in its work, rapid in action, and low in price. Mr. Harper Twelvetrees of Finsbury Pavement, exhibited his popular 'Villa' washer, and Messrs. Bell and Co., Oxford Street, had a good assortment of the Home washer, and other kindred appliances, and Messrs. Thomas Green and Son, Limited, of Leeds and Blackfriars Road, not only showed washing and wringing machinery, but had a large collection of their patent 'Silens Messens' lawn mowers, sausage chopping machines, sausage filling machines, garden rollers, welded boilers, etc. Mr. Maughan of Cheapside, showed numerous examples of his patent geyser, and the application to baths, and Messrs. Ewart

and Son, Euston Road, had a similar class of exhibit with their Crown heater, now made to burn all gas, as well as atmospheric gas, and with an arrangement for carrying off the products of combustion.

Messrs. Stott and Co., of Oldham, were present with their patent mercurial gas governor for regulating domestic supply, and a variety of 'governor' gas burners, etc., and the Peckham Gas-burner Company had also a large assortment of Duplex and other burners that show to advantage.

Of labour-saving appliances for the kitchen, there was an endless variety; Mr. George Kent of Holborn having been the most prominent. This firm occupied the centre of the hall with a structure built up of knife machines, refrigerators, sausage and mincing machines, patent carpet sweepers, and the numerous other articles for which the name of Kent is famous; while Messrs. Spong and Co., Holborn; Davis, Leadenhall Street; Lyon, Windmill Street, Finsbury, and others, contributed in a smaller degree similar domestic appliances. We must not forget in this department an attractive little stand from Messrs. Richard Hodd and Son, Minerva Works, Hatton Garden, filled with the Lady-help, Despatch, and Perfection knife-cleaners, a description of which will be found in our last month's issue.

Mr. C. H. Southall, Armley, Leeds, exhibited his patent automatic boot-cleaner, made in different sizes, to work by either hand or steam power. This machine will brush off the dirt, put on blacking, and polish without stopping the machine. The action is precisely that of the human arm, the brush moving backward and forward with rapidity, while every part of the boot or shoe to be polished is presented alternately to the brush; and children's boots, so difficult to hold by hand, are by this machine polished as easily and brightly as any others. It is claimed that by this contrivance a child may clean the boots of the largest family without fatigue, and better than a man could do them by hand.

Messrs. Robert Boyle and Son, of Holborn Viaduct and Glasgow, made a good display of their specialities in ventilators for the various purposes to which they are applied, and which we have had the pleasure of describing in these columns. Messrs. Kite and Co., Chalton Street, N.W., exhibited their patents for similar uses, including a simple but effective arrangement for ventilating stables, cowhouses, etc., by means of a dormer or ridge ventilator fixed on the apex of the gable with louvres, having a double valve inside, which opens or closes by means of a cord and balance-weight. The valves, being covered with fine gauze wire, allow of the emission of the heated atmosphere, but effectually prevent the admission of fog, etc. Mr. J. M. Taylor, Tuilerie Street, Hackney Road, showed his 'Eclipse' ventilator, used either as a chimney-cowl or ventilating shaft; and Messrs. Ewart and Son had a display of their popular 'Empress' ventilators, which are too well appreciated to need further comment.

An improved institution bedstead was shown by Mr. Stidolph of High Street, Dartford; made of wrought iron, with a strong canvas double or 'endless' bottom, it does away with the objectionable iron laths, and produces agreeable buoyancy with the greatest strength. On the score of health and cleanliness, we see some valuable points in this article, and it should be largely patronised.

A simple arrangement to prevent the noise attendant upon taking coals from the box, and called a 'Noiseless' Coal Box, was exhibited by Messrs. Nettlefold and Sons, Holborn, and should strongly recommend itself for use in sick rooms in particular, though it appears equally applicable for use under ordinary circumstances. An ingenious self-acting coal box was shown by Mr. Warner of Devizes.

A lamp for burning mineral oils, called the 'Empress', of American invention, was shown by Messrs. Phillipson and Son of Water Lane, E.C., and presents a very novel feature for consideration; the necessary amount of air to promote combustion being presented to the flame by means of a little fan and coiled spring at the bottom, and communicating with a chamber around the oil fount, which at the same time keeps a current of cool air around the oil, and prevents it becoming heated. It burns without chimney or globe, unless the latter is made use of for effect, and the light produced is of the whitest and most brilliant colour, at a very small cost.

Mr. Adams, Great Dover Street, Borough, sent a variety of small domestic articles connected with the doors and windows of our houses, a class of work that has gained him considerable popularity amongst architects and builders. The exhibit comprised his patent fan-light openers, compensating spring hinges for heavy doors, patent safety window, sash fasteners, new simple Venetian blind holder, etc.

An useful little machine for cleaning silver or plated forks was exhibited by Messrs. Hutchison and Co., Fann Street, Aldersgate Street. The apparatus, which is 23 inches long, cleans six forks at one time, by means of two soft brushes, one underneath and the other above, travelling horizontally with a soft and uniform pressure, evenly distributed throughout their surface. The arrangement for fixing and taking out is simple, and the operation quick and effective.

Of concentrated foods, cleaning requisites, etc., there were a variety shown, with many of which the public are familiar. Branson's Coffee Extract was made a prominent feature, and is said to be largely increasing in demand. Messrs. Gallais and Co., Margaret Street, W., introduced a variety of mineral waters from France, Prussia, etc., and a very excellent claret of their own growth from Potensac, Médoc. Messrs. Geyelin and Co., Belgrave House, Argyle Square, showed a variety of their concentrated soup and sauce powders, drinks, etc. The Consolidated Soup and Food Company, 23, Castle Street, Finsbury, had also a good collection of their specialities in this direction.

Mr. David Salmond, Bradford, Yorkshire, introduced his olive oil (potash) soap, which has long been used in the manufacture of wool goods, and is strongly recommended for laundry purposes. Jeyes' Sanitary Compound Company, Limited, Bishopsgate Street, showed their 'Perfect' purifier, sanitary powder, disinfectants, and toilet soaps; and Messrs. Scott and Co., Glasgow, a variety of soaps manufactured from petroleum. Pond's Extract Company, Limited, of Oxford Street, were present with their various preparations of hamamelis for the cure of gout, neuralgia, rheumatism, etc.

One of the most interesting features of the exhibition was the presence of several of the inmates of the Association for Promoting the General Welfare of the Blind, Berners Street, Oxford Street, a home founded some years since by Miss Gilbert, a lady who has devoted much time and money to promote its success. They appeared well fed and clothed, and the picture of health, and were daily engaged in brush making, sash-line making, chair caning, and

basket making. Boys from Dr. Bernardo's homes were also present occupied in a similar way, and presented a smart appearance.

COMPULSORY SANITARY INSPECTION OF DWELLING-HOUSES.

A DEPUTATION recently waited upon Mr. Dodson, President of the Local Government Board, with regard to the sanitary inspection of houses. The deputation consisted of Mr. Staveley Hill, M.P.; Lieutenant-Colonel Thorneycroft; Professor Fleming Jenkin, F.R.S., Captain Douglas Galton, C.B.; Mr. J. Whichcord Prescott, R.I.B.A.; Mr. C. M. Cresswell; Mr. G. Eastlake Thoms (borough engineer, Wolverhampton); Mr. G. Hurst Stanger, C.E. (engineer to the Wolverhampton Sanitary Protection Association); Mr. Ernest Hart; and Mr. J. Kennington (engineer to the Birmingham Sanitary Association).

Mr. HILL, M.P., said the gentlemen forming the deputation were interested in the extension of the powers of inspection with regard to dwellings. Although powers were already given under the Public Health Act, 1875, they thought they ought to be extended so as to produce a more satisfactory inspection of all matters connected with the requirements of dwellings.

Colonel THORNEYCROFT (Wolverhampton) said that since the introduction of baths, water-closets, wash-basins, and sinks into houses, proper care had not been taken in conveying the water from them into the drains after it became dirty; traps and ventilators had been neglected, and the consequence was that the sewer gases, which were generated in the drains, went back into the various parts of many houses, creating fever and disease, frequently resulting in illness and death. Inmates of houses were often ignorant of the cause of death, which in reality was due very frequently to poisonous gases. To remedy these evils, sanitary protection associations had been appointed in Edinburgh and Wolverhampton. One was recently started in London. In Wolverhampton, the annual charge for inspecting a large house was ten shillings, with five shillings entrance fee for the first year. This was done by a properly-appointed civil engineer, who went carefully over all the house and premises, and who gave a written report respecting its sanitary condition. The landlord or tenant could have any alterations made or not as he pleased, it being a voluntary association. What they wanted was for the Local Government Board to forward a movement to make inspection compulsory in all houses, manufactories, hospitals, shops, workshops, places of worship, theatres, institutions, streets, roads, and byways; the inspector to be properly qualified to give the owner and occupier of the place a written report, with particulars of such alterations as were obliged to be made, the cost of alterations to be paid by the owners of the property; and the payment of the inspector to be made out of the rates of the place; any disputes to be settled by the local authorities; a reasonable time to be allowed for making the alterations, and, if not done, the local authorities to do them and charge the cost to the owner. Large houses required inspection more than small ones, from the extra quantity of baths, closets, and drains they contain. Why should the Government delay one moment longer to put an end to so deadly an enemy to human life? This could be done by lessening the inmates in hospitals and workhouses, which would have the effect of reducing the poor-rates, and introduce a far more agreeable person to many a house than the undertaker, viz., the sanitary inspector. It was no party question, as all politicians must be equally anxious to improve the health of Great Britain and Ireland with the least possible delay.

Professor JENKIN stated that associations had been started in Edinburgh, supported by subscriptions, for the purpose of inspecting dwellings. In the course of their inspection of 1,248 houses, they found that, in 76 per cent., or about three-quarters, there was a connection between the cisterns supplying the drinking-water and the drainage-system of the house. In 22 per cent. of the cases they found leaky soil-pipes discharging sewer gases directly into the houses, many of the leaks being strong enough to extinguish a lighted candle. Unless there was a systematic and regular inspection from year to year, these defects must exist and must escape detection. A third defect they had discovered was actually the total stoppage of the drain; but this was less frequent. In Scotland, they got about 1 per cent. of the houses where there was no drainage whatever, and, in London, about 6 per cent. The machinery for regular inspection already existed, and, in each house, there were only two things really to find out —are the pipes tight? and does the drainage leave the house?

Mr. DODSON: Subsidence sometimes causes pipes to give way.

Professor JENKIN: Precisely; especially in newer houses.

Mr. STANGER suggested that the bye-laws prepared by the Local Government Board should be made more compulsory, and not, as now, optional. These bye-laws gave the most minute details for the fitting up of closets, sinks, and ventilation of dwellings. If these were made compulsory, then the inspector would have to see they were carried out, and, afterwards, to prove that they were in working order.

Mr. DODSON: Then you propose to make it compulsory on the householder, on the report of the inspector, to mend his drains according to the recommendation of the inspector?

Mr. STANGER: Not the inspector personally. The details are already set out in the bye-laws, and, if these were general, he would only have to see that they were carried out in each house.

Mr. DODSON: You would apply that not only to new but to old houses?

Professor JENKIN said he had not ventured that far, as the cost of reconstructing the drainage of old houses in Edinburgh would be enormous.

Caplain GALTON pointed out that, if one had reason to believe that the soil-pipe of a neighbour's house was leaking, there was at present no power to examine it. It was very desirable that the local authorities should have the power of inspecting the sanitary arrangements of houses.

Mr. DODSON: Is your proposal that the Local Sanitary Authority should not only have the power of inspection, but that they should, if necessary, require the householder or owner to alter the drain?

Captain GALTON replied that such was the object the deputation had in view, leaving it to the Local Government Board as the proper persons to decide whether the occupier or the owner of the property should be liable.

Colonel THORNEYCROFT added that their object was to have all houses and public places of all sorts subjected to regular inspection, the owners to be liable.

SNOW CLEARING IN CONTINENTAL CITIES.

THE following account of snow clearing in Milan, by Signor E. Bignami Sormani, is reprinted from the abstracts of papers published by the Institution of Civil Engineers. It may furnish useful hints to our Municipal Authorities, for dealing with such contingencies as the memorable snowstorm of Jan. 18th:—'How greatly the labour and cost of snow clearing in a city are affected by variations in the density of the snow itself, is shown by the results of observations made by Professor Clericetti and the author, with the aid of a simple balance and compressing-box, both of which are described and illustrated. The range of density in fresh-fallen snow is found to be as great as eleven times, a cubic yard from one snowstorm weighing as much as 814 lbs., and from another only 71 lbs. The records are furnished of a number of observations. Other circumstances affecting the labour and cost in different parts of a city are the northerly or southerly aspect of the streets, the amount of traffic through them, and the distance to which the swept snow has to be carted away. In Milan the snow-carts are emptied into the navigable canals and numerous watercourses by which the city is intersected; and latterly also into the new sewers in the central portion of the city, which are promptly flushed whenever it snows. During the winter of 1879-80 the cost of clearing the 1,656,200 square yards total area of squares, streets, and lanes within the city walls averaged £200 per inch depth of snow fallen, and for the 502,800 square yards outside the walls, the average cost was £62 per inch depth, equivalent in each case to about 1.05d. per cubic yard. Ordinarily, the clearing of the more frequented streets is completed within eight or ten hours after it has stopped snowing; and of the rest within twenty-four hours, not reckoning night. The organisation of the admirable arrangements by which this work is accomplished with such remarkable despatch and efficiency, is ascribed by the author to his predecessor in its direction, Signor Annibale Gafforini. The city is parcelled out into small districts, numbering 112 for last winter, of varying extent, according to the importance of the work in each. An average rate of pay per inch depth of snow fallen, is settled for the whole area of each separate district, according to its extent and the particular conditions affecting the several streets and squares comprised within it. Each district is allotted to a contractor, who usually associates with himself six to ten partners, besides the labourers whom he employs. He has to find carts, horses, and carters; the necessary implements—spades, shovels, brooms, scrapers, mattocks, barrows, etc.—are furnished by the city, under suitable stipulations for ensuring proper care in their use. A copy is given of the complete form of contract now employed, comprising upwards of thirty clauses; the contracts are made annually, and the same persons almost always apply for them again year after year. The contractors come principally from the trades that are interrupted by winter—paviors, bricklayers and masons, and gravel quarrymen. For the direction and supervision of the work, the whole city is divided into four sections, over each of which is appointed an engineer, with an assistant, who are aided in the general arrangements by the police surveillance. Payment is made only for work effectually done. In each snowstorm the depth of snow falling, which is the basis of pay, is ascertained by means of a number of stone posts, fixed in suitable open spaces, clear of shelter from buildings, and each capped with a flat horizontal slab of stone. As soon as it stops snowing, or two or three times during a storm of several hours, the depth of snow caught on the slabs is measured by the engineer in the presence of two of the contractors in his section. The number of men ordinarily engaged in snow clearing on a winter's day is not less than two thousand, and has sometimes risen to three thousand. The stock of implements found by the city, representing a capital of about £1,600, is housed in two stores in opposite quarters of the city. In the winter of 1874-75 the total fall of snow amounted to 40¾ in., and the whole expenditure for clearing it within the city walls exceeded £8,400; while in 1877-78 the fall was only 5¼ in., involving an expenditure of less than £1,040 for a slightly larger area. Tables are given for the last ten winters, showing the depth of snow that fell in each, the extent of area cleared inside and outside the city walls, and the cost of clearing. The author concludes with some remarks upon sanding in frosts, and upon the advantages of amalgamating the several branches of the organisation necessary for the care of the streets in cities like Milan.'

Colonel de la Poer-Beresford writes to a contemporary from Dresden that the following plan is adopted in that city:—To a construction, in plan a right-angled triangle, composed of planks some eighteen inches in depth, nailed together and strengthened by transverse bars, horizontally placed and heavily-weighted, a horse is attached by collar-chains, which hook on to staples on the sides forming the right angle, equi-distant from it. This, drawn by the animal, throws the snow in heaps to either side, whence it is removed by wooden shovels. No brooms are used, as they retard the operation.

The system in Paris is as follows:—The city is divided into twenty-nine districts, each of which is farmed out to a contractor, who engages to clear it on his own responsibility. It is for him to hire carts and labourers, and to apportion out the work in accordance with the plans; and he is heavily fined if in any part of his district the business is not proceeded with in due course. The streets themselves are divided into three categories—first, the great thoroughfares, which are ordered to be at once cleared of all the snow lying on them; secondly, the intermediate streets, in which the snow is first brushed away into two long heaps, stretching along their sides; and thirdly, the smaller roadways, in which the snow is merely swept into a single rampart along one side. To each contractor, and also to the directors of the *ponts et chaussées*, a map is given, in which these several categories of streets are coloured in red, blue, and yellow, so that the work goes on with regularity and according to the set design.

The Local Government Board has issued a Circular to the Sanitary Authorities throughout the country, suggesting that special precautions should be taken in regard to foreign pork and bacon, with a view to avoid the disease of trichinosis, of the present existence of which in Great Britain the Board has no information. Attention is called to Sections 116—119 of the Public Health Act, 1875, relating to unwholesome meat, which the Inspectors are enjoined to use special vigilance to carry out.

The Town Council of Brighton have decided to provide a sanatorium for the town, and to carry out the plans originally submitted by the town surveyor, at a cost of £15,000.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

COMBINED DISTRICTS.

CRAVEN COMBINATION.—The active and energetic Officer of Health for this combination, Dr. Fred. W. Barry, has now left it to go to Cyprus as Sanitary Commissioner. That he has left his mark upon the district during his short tenure of office is, however, indisputable. Appointed in February 1878, Dr. Barry at once set earnestly to work to improve its sanitary condition, and succeeded in inspiring even the Local Authorities with a share of his enthusiasm. Already a considerable number of places have been drained, or supplied with pure water, or improved in other ways, and there is promise of a great deal more. A house-to-house survey, that *sine quâ non* of sustained sanitary work, was in an advanced state when Dr. Barry left the district, and records of the exact sanitary condition of every house in nine of the more populous places were absolutely completed. In many directions there is evidence of substantial sanitary progress, and it is to be hoped that the Local Authorities having begun so well under Dr. Barry's guidance, will continue equally active under his successor. The districts comprised in the Craven district are the Settle, Skipton, and Keighley Rural, and the Skipton, Silsden, Oakworth, Haworth, and Oxenhope Urban Authorities. Its total area is 338,652 acres, and its estimated population 69,268. Dr. Barry had a salary of £400 a year, half of which was paid by Government. No allowance was made for travelling, but all other expenses, such as for laboratory, stationery, etc., were allowed. The district was compulsorily formed through the exertions of the Local Government Inspector, the Skipton Rural Authority being unwilling to join. Since his appointment, Dr. Barry has issued a number of most excellent reports to his Authorities, making also a number of special reports (to which we have before referred in terms of commendation) on the sanitary condition of individual places. These, bound up with his several annual reports for 1879, form a goodly volume, which will remain a permanent record of Dr. Barry's industry. The vital statistics of 1879 are interesting, but would take up space we cannot spare if dealt with in detail. It must suffice to give from the annual report on the district as a whole, certain figures applying to the entire area. The number of births registered therein during 1879 was 2,188, equal to a birth-rate of 31.58 per 1000 of the estimated population. Of these, 1,381 were registered in the rural, and 807 in the urban districts, giving 30.9 and 32.6 as the respective birth-rates. There were 1,390 deaths registered in the whole district, equal to a death-rate of 20.0 per 1,000 living; of these 888 were rural and 502 urban, giving death-rates of 19.9 and 20.3 respectively. The mortality in the Skipton rural district was high, owing to the great fatality from scarlet fever, no less than 46 deaths being ascribed to that cause. The infant death-rate is also very high for a rural district. In Silsden the proportion of deaths amongst children to births registered is the highest in the district, being equivalent to 18.0 per cent. The general death-rate was lowest in the Oxenhope urban (15.7), and the Settle rural (15.8) districts. The proportion of deaths amongst children under one year to births registered was lowest in the Settle rural district (9.4 per cent.), being 4.2 per cent. below that of England and Wales. The infant death-rate was also below the average of England and Wales in the urban districts of Haworth (10.7), Skipton (11.7), and Oxenhope (13.0); in the remaining districts it was above the average. A large proportion of the deaths were due to phthisis and diseases of respiratory organs, 151 being caused by consumption and 328 by bronchitis, pneumonia, and pleurisy, together equivalent to 6.9 per 1,000 living. The zymotic rate was above the average (2.3) for all England, in the Haworth (4.4), Silsden (4.0), Oakworth (3.2) urban districts, and in Skipton rural district (3.1). It was extremely low in the Settle rural district (.9), and in the Skipton urban district (1.0), and no deaths were recorded from zymotic disease in Oxenhope. Thus the healthiest districts during the year were the Settle rural and the Skipton and Oxenhope urban, and it will probably not be too much to say that this is largely owing to the improved sanitary condition of these portions of the district. The district was entirely free from small-pox during 1879. Measles was very prevalent over the greater part of the district during the third and fourth quarters, and German measles prevailed at Gargrave, Skipton, Settle, and Giggleswick. Scarlet fever was present in an epidemic form in the first and second quarters in the Skipton and Keighley Unions, where 48 and 6 deaths respectively were ascribed to that cause; of these 33 occurred at Barnoldswick. Twenty-eight deaths were ascribed to whooping-cough; it prevailed chiefly in the first quarter of the year, being in fact, a continuation of the epidemic of 1878. Only one case of diphtheria was reported during the year. Fever is debited with 27 deaths, but the number actually due to specific fever is considerably lower, as in many cases no specific characters were found. Several cases, some of which were fatal, were ascribed to typhus, but in no case were the specific characters of typhus found. Outbreaks of enteric fever occurred at Glusburn (4 fatal), and Barnoldswick (3 fatal), and sporadic cases at Silsden, Oakworth, Haworth, and Giggleswick.

EVESHAM COMBINATION. — This combination, which was formed in August 1873, by the voluntary combination of the Local Authorities composing it, consists of the Alcester, Stratford-on-Avon, and Evesham rural districts, and the Stratford and Evesham urban districts. The total area is 177,952 acres, and the population 56,168. The Health Officer is Mr. G. H. Fosbroke, jun., S.Sc. C. Camb., who has worked hard and energetically in the district in apparently better relation with the Local Authorities than an active Health Officer usually achieves. In his last annual report, Mr. Fosbroke gives certain comparative statistics for the three rural districts under his charge, which shed an important light on the value of his labours in the district. It is to be regretted that no similar statistics have been published for the urban districts, because in their absence a complete picture of the improvement is not obtainable; but the figures that are available are sufficiently striking. The three rural districts collectively contain 169,080 statute acres, 80 parishes, and a population of 44,059. The population of only a very few parishes exceeds a thousand persons, the people, except those in five needle manufacturing centres, being mainly engaged in agricultural pursuits. The average death-rate varies but little in the Stratford and Evesham districts, but the corresponding one of the Alcester district is higher. The death-rate in the Stratford district has not exceeded 16.3 per 1,000 during the five years ended December 1879. The highest mortality, 22.7 per 1000, was recorded in

the Alcester district in 1875, partly due to the unusual prevalence of whooping-cough and small-pox, and partly to the exceptional fatality of 'chest affections'. The next greatest mortality (21.9), occurred in the Alcester District in 1879, and was due to the excessive mortality among 'persons aged 60 and upwards', and to the prevalence of 'measles' and 'fever'. The highest rate of infant mortality was recorded in the Alcester Registration District (132 per 1000), and the lowest in Stratford-on-Avon (99 per 1000). The excessive 'infant mortality' occurs in the urban portion of the population, and particularly in the needle manufacturing centres. The employment of female operatives in needle manufactures mainly accounts for the high mortality recorded, inasmuch as bad nursing, improper food, exposure to cold, etc., frequently fall to the lot of children whose mothers spend the greater part of the day in such labour. Of zymotic diseases, small-pox was prevalent at Alcester in 1875, when 75 cases occurred. Measles was not specially prevalent until 1879, when it was exceptionally fatal in the Alcester Union. Throughout the five years scarlatina was a persistent visitor in the Alcester Union, the greatest number of deaths recorded in one year in any district, with exceptions in two years, being less than the lowest number returned in Alcester. Of the sanatorium which has been provided, Mr. Fosbroke says it is impossible to speak too highly. Its maintenance has certainly cost the ratepayers a considerable sum, but he is convinced that such money has been well invested, inasmuch as the hospital enabled him to quickly stamp out outbreaks of zymotic disease, which, had they not been 'nipped in the bud', would have greatly increased the rates. No less than 272 patients suffering from small-pox, or scarlatina, have been treated in this Institution, and it is pleasing to note that 'compulsory removal' of patients to it has never been necessary, and that although the number of the patients treated was large, only ten deaths have occurred among them. Diphtheria has been comparatively more fatal in the Evesham district than in either of the other two. Two epidemics have occurred in the Alcester Union, one in 1877 and one in 1878. Mr. Fosbroke's experience of this disease leads him to favour the opinion that it may arise *de novo*, and that all insanitary conditions, particularly polluted water, are often intimately associated with its origin and dissemination. The highest death-rate from fever recorded in the last five years in the Stratford Union was in 1876, when four deaths were registered from this cause. All these were sporadic cases, and three of them were associated with the use of polluted water. The death-rate from fever of the Alcester district varied from .1 per 1000 in 1877, to .7 per 1000 in 1879, the year 1875 standing second with a death-rate of .3 per 1000. No outbreak of typhoid fever of serious dimensions occurred in the Alcester district in 1875, the seven deaths recorded having been scattered over the district. 1879 was a year noted for the fatality of fever in the town of Alcester. The outbreak was clearly due to the use of the polluted well-water in the town; and it is particularly noteworthy how all those persons who used the 'Company's' water escaped. Evesham district was free from any serious outbreak of typhoid fever during the quinquennium 1875-79. Mr. Fosbroke concludes his very interesting account with a statement of the sanitary improvements which have been effected during his tenure of office. From this it appears that a sanitary survey of all houses in the district, on the plan of Dr. Bond, has been well nigh completed. Urban powers with respect to slaughter-houses have been granted by the Local Government Board for the populous places of the Alcester, Evesham, and Stratford-on-Avon rural sanitary districts, and bye-laws framed under these sections have been sanctioned. Circulars giving plain instruction for preventing the spread of infectious diseases have been adopted, and freely distributed in all districts known to be so invaded. Disinfection of all infected dwellings has been personally superintended by the Inspectors of Nuisances. Arrangements have been made by the Alcester and Evesham Rural, and Evesham Urban Sanitary Authorities, with the medical practitioners in these districts, to notify all cases of small-pox, scarlatina, typhoid fever, and diphtheria that occur. The fee paid by the Local Authorities is 2s. 6d. for the first case that appears in any dwelling. A sanatorium has been erected in the Alcester district. Very considerable improvement has been made in the excrement disposal of the whole district; for this a few years ago was generally effected by the old-fashioned midden system, with its consequent abominations. The improvement has been, and is now, gradual but persistent. Five villages have been supplied with water on the constant system, and an increased supply has been rendered available for others. In the town of Alcester a water-works company have supplied the demand. Works of sewerage have been undertaken in twelve towns and villages, and other schemes are now under consideration. Many dilapidated cottages have been rendered habitable, and many cases of overcrowding abated. In many parts of the district, however, the difficulty experienced in dealing with the latter nuisances is great, as the number of labourers' dwellings is limited.

WEST SUSSEX.—The combination of sanitary authorities in West Sussex is fortunate in being served by so skilled and energetic an Officer of Health as Dr. Kelly. Though his district is of an irregular and somewhat inconvenient shape, Dr. Kelly seems to be able to supervise it without difficulty, and he reports of the combination that it works very well. The Horsham, Shoreham, and Arundel Urban Districts, and the Littlehampton Port District, locally situate within the area of the combination, are not included in it, and in certain other respects it seems susceptible of improvement. The district (formed by voluntary action) originally comprised the Steyning, Horsham, Petworth, Thakeham, and East Preston Rural Districts, and the Worthing, Littlehampton, and West Worthing Urban Districts, to which the Midhurst Rural District has been since added. The area of the district is 296,388 acres, and its estimated population is 85,102. Dr. Kelly's salary is £600 a year, half of which is paid by Government. He is not allowed to practise privately, but was lately permitted to take up the appointment of Professor of Hygiene at King's College, London. No allowance is made to him for travelling, laboratory expenses or stationery, which probably cost a considerable sum. Dr. Kelly's reports have always been of a complete and interesting kind. The first report was concerned more with general principles than with details of work; but the remaining five reports have dealt at length with the mortality figures of each district in the combination, and with the sanitary improvements effected and required. Matters of general interest, such as the etiology of disease, the relation of phthisis to dampness of soil, the water-supply of villages, and the like, have been discussed in the reports by the light of the experience of West Sussex; and to each report but the

third a general statement showing the movement of population in the entire district has been added. The reports, indeed, are extremely favourable specimens of their class, and may be read with equal profit and interest. Dr. Kelly has not yet taken stock, as it were, of the sanitary improvements and the saving of life effected in the district since the formation of the combination; but it is possible to get from his reports a tolerably clear notion that, as a matter of fact, considerable progress has been made. Thus the death-rate of the district for 1879 (15.1) was lower than the average of the four previous years; the infant mortality (88 per 1,000 births) was also less, and so was the mortality from zymotic diseases (0.9 per 1,000). The highest district death-rate in the combination was 17.3 (Midhurst Rural), and the lowest (West Worthing Urban) 11.4 per 1,000. The prolonged and intense cold of the first quarter proved very fatal to young and old, while it hardly affected those between five and sixty. From zymotic disease, 79 out of a total of 1,292 deaths from all causes were registered. Nine of these were from measles, 2 from scarlatina, 22 from diphtheria, 17 from whooping cough, and 9 from enteric fever. The only disease needing mention was diphtheria, which prevailed in several districts, and at Lurgashall assumed the form of an epidemic. In both the Midhurst and Petworth districts diphtheria is of frequent occurrence, and this is more especially the case in those villages that are on the Weald clay. There seems, therefore, reason for supposing that soil has a not unimportant relation with the disease—a subject to which much attention is devoted in the report. Dr. Kelly also discusses with much ability the question of the relation of phthisis to dampness of soil; and he adduces figures which seem to throw doubt on the reality of this relation as enunciated by Dr. Buchanan in 1867. Adequate information is given as to the progress of the various districts in the matters of drainage and water-supply, and generally the report is a most complete and satisfactory one. The appended tables are very full, and those given with regard to each district, showing the mortality from a number of causes in the periods 1851-60, 1861-70, and 1875-9, are at once novel and valuable.

LAW REPORTS.

IMPORTANT DECISION.--DISINFECTION OF PREMISES.

Fergusson v. *Nurthen.*

This was an action at the Dorking County Court, before A. Martineau, Esq., Judge, to recover the sum of £17 8s. 7d. brought by the plaintiff, Mr. Hugh Fergusson, of Fern Villa, South Holmwood, Dorking, against Mr. R. F. Nurthen, Chemist, 390 Strand, for certain dilapidations, rent in lieu of notice, also, for cleansing and disinfecting premises, bedding, etc., whilst a lodger in the plaintiff's house at South Holmwood. From the evidence given at the hearing of this case, it was proved that the defendant, during the past summer, had been the occupier of the plaintiff's furnished house, and that, immediately after the commencement of his tenancy, his children failed with scarlet fever. When they recovered they left the premises without giving any notice to the plaintiff. After they had gone the sanitary authority of the Dorking Union caused notices to be served upon the plaintiff for the cleansing and disinfecting of the house and its contents; this work he carried out to the satisfaction of the sanitary authority, and called upon the defendant to reimburse him the amount. Defendant refused, consequently this action was brought.

The Judge said that he had looked into the Act of Parliament (Public Health Act, 1875), and found it is silent on the matter. The disinfection is to be done at the expense of the owner or occupier, and the sanitary authorities, finding that the house requires disinfecting, go to the person who is in the occupation, and call upon him to disinfect, but, if the occupier is a man of straw, the authorities probably make an application to the owner. The Act appeared to him to leave the burden upon the person on whom the sanitary authority may choose to cast it; then the question is, as to who shall bear the cost, and as he found nothing as to how the law of the question is held before the Public Health Act, and there is nothing in that Act, so far as he could find, to decide who is to bear the expense, he found he must look solely at the law of landlord and tenant. He held that in the case of an occupier or lodger having scarlet fever, it is his duty to bear the burden of disinfecting the premises, and he is bound to deliver up the same in a similar condition as they were upon his entering.

As to the two weeks' rent claimed in lieu of notice, as it appeared from the evidence that the defendant might fairly consider that by the understanding that was come to he was entitled to leave at any time without notice, the Judge reduced the claim by the sum of £5 9s. 7d. in respect of these items, and gave judgment for the plaintiff for £12 9s., with the usual costs.

HAMPSTEAD SMALL-POX HOSPITAL.

Hill and Others v. *The Managers of the Metropolitan Asylum District.*

This was an appeal from the decision of the Court of Appeal. The main question was whether the defendants, the present appellants, were liable for alleged damage arising from the establishment of the hospital, and from the manner in which it was carried on, or whether the statute under which they acted afforded them a full or only a qualified protection.—The Lord Chancellor, after recapitulating the facts of the case, and referring to the 5th, 7th, and 15th sections of the Metropolitan Poor Act 1867, and the orders of the Poor Law Board, said, in his opinion, the Act did not necessarily require anything to be done which might not be done without creating a nuisance. The Legislature had manifested no intention that any of the optional powers conferred on the managers should be exercised so as to interfere with any man's private rights. The Legislature had enabled the Poor Law Board to order and the managers to perform certain things if, when and where they could obtain by free bargain and contract liberty to do so. No interference with any private rights was recognized, and no space was defined within which the establishment of such an asylum was made lawful. The managers could not have taken a single foot of ground or easement against the will of the plaintiffs or any other persons to whom such ground or easement might belong. Under these circumstances, he was clearly of opinion that the Poor Law Board and managers had no statutory authority to do anything which might be a nuisance without the consent of the plaintiffs, and

therefore he moved that the judgment of the Court below should be affirmed, and the appeal dismissed with costs.—Lord Blackburn was also of opinion that no intention had been shown on the part of the Legislature to allow the erection of an asylum on the space in question which might create a nuisance to the plaintiffs, and infringe private rights.—Lord Watson concurred. The power given by the statute was permissive, and not imperative, and he was unable to find anything in the case which would support the plea that the Legislature intended to authorise an asylum to be erected which would be a nuisance to the neighbouring proprietors.—The appeal was therefore dismissed with costs.

PUTRID PORK.

At the Taunton Police Court, George Rugg, of Bridgwater, was charged under the 117th section of the Public Health Act, with being the owner of seventy pieces of pork deposited for sale, the same being unfit for human food, at Taunton St. James. Defendant pleaded 'Guilty'.

Dr. Henry James Alford, the Medical Officer of Health, gave evidence as to the condition of the pork, pronouncing it to be quite unfit for human food, and likely to impart disease to any person or animal who ate any of it. A sensible witness stated that the defendant offered to sell her bacon at 3d. per lb., but she would not look at it, saying it was too cheap to be good.—Defendant was fined £5 and costs, or in default one month's imprisonment.

THE ABATEMENT OF NUISANCES.

This was an application on the part of Mr. C. J. Whitchurch, heard before Mr. Baron Pollock and Mr. Justice Stephen in the Court of Queen's Bench, to make absolute a rule *nisi* granted by Mr. Baron Pollock in chambers, calling upon two justices of the borough of Nottingham to show cause why a writ of *certiorari* should not issue to bring up and quash an order made by them on the 20th August 1880, upon the complaint of Mr. W. Richards, Sanitary Inspector of the borough.

Mr. Philbrick, in showing cause for the respondents, said that the applicant was the owner of a house situate in Nottingham, and that the privy and ashpit belonging thereto becoming offensive, the Town Council on the 3rd July, 1880, served a notice under section 94 of the Public Health Act, 1875, requiring him to abate the nuisance by filling up the ashpit, abandoning the privy, and constructing a proper and sufficient pail closet. This notice not being complied with, the Town Council caused Mr. Whitchurch to be summoned before the justices, and he not appearing at the hearing an order was made that he should execute the works required by the notice.

Mr. Philbrick then contended that this order was good, inasmuch as section 94 of the Act provided that the preliminary notice to be given by a local authority shall state what works are necessary for the purpose of abating a nuisance, and by section 96 the justices are to order compliance with all or any of the requisitions of the notice, consequently it would appear that the legislature intended to vest in the local authority the power to decide what should be the nature and extent of the works to be carried out by an owner in abating a nuisance, and that this being so it was perfectly legal for the Town Council to call upon Mr. Whitchurch to execute such structural works as would change the nature of the accommodation from a privy and ashpit to a pail or earth closet. Mr. Philbrick then pointed out that the vesture of such a power in the Town Council was only reasonable, as it was responsible for the proper sanitary government of the borough.

Mr. French, for the applicant, argued that the order should have been limited to a direction to execute such work only as would be sufficient to remove the offensive state of the ashpit and privy, and that the sections in the Act of 1875 relating to nuisances did not empower the Town Council to enforce pail closets to houses where privies and ashpits had previously existed, and that it was only under section 36 of the Act that the erection of a pail or earth closet could be required, and then only in case of insufficient privy accommodation. Moreover, in the latter case, the owner had an appeal to the equitable jurisdiction of the Local Government Board, and any expenses incurred by the local authority could be made private improvement expenses; whereas in the present case the proceedings of the Town Council were of a quasi criminal character, and the expenses were recoverable summarily. This being so, he submitted that section 94 must be construed strictly.

Baron Pollock, in giving judgment, stated that the whole question turned upon the construction to be placed upon section 94, which required that a notice shall be served on the owner of the premises on which the nuisance arises, requiring him to abate the same within a time to be specified on the notice, and to execute such works and do such things as may be necessary for that purpose. In his opinion these words did not vest in a local authority the power to compel an owner to execute any works which the authority might see fit to direct, but such works only as were necessary for the purpose of abating the nuisance complained of. The order was therefore defective in requiring Mr. Whitchurch to substitute a pail closet for the privy and ash-pit, and he remarked that it would be an interference with the liberty of the subject if it were to be held that a local authority could compel an owner to adopt one particular method of closet accommodation about which it was well known that medical officers of health and chemists had considerable difference of opinion.

Mr. Justice Stephen concurred, and said the contention of the respondents was opposed both to the grammatical and common-sense reading of the section.

Mr. French then applied that the applicant should be granted costs, and stated that although it was the ordinary practice of the Court in Crown cases not to order justices to pay costs, still that this rule was departed from where other parties interested appeared to show cause, and that in the present case it was really the Town Council of Nottingham that had shown cause.

Mr. Philbrick replied that he had shown cause on behalf of the two justices, and that he was instructed by their solicitor.

Baron Pollock said that being so the rule would be made absolute, without costs.

BUTTTERINE AND THE FOOD AND DRUGS ACT.

John Brough, shopman to Mr. Turnbull, grocer, was charged before Sheriff Cheyne, of Dundee, with selling 1lb. of butter which was not of the nature, substance, and quality demanded by the Adulteration of Food Act. Two policemen stated

that they went to the shop and asked for 1 lb. of butter for which they paid 1s. Before leaving the shop, they told Brough and his master that they had bought it for the purpose of analysis. Brough and Turnbull thereupon directed the attention of the policemen to the fact that the paper in which their purchase had been wrapped, bore a notice to the following effect:—'Mixed butter. Notice, to the best of my judgment, I purchase none but genuine butter, but as it is impossible for me to get every cask subjected to analysis, I sell it as butterine.' Mr. Macdougall, public analyst, said he had analysed the article sold, and found it contained fat to an extent not under 75 per cent. The public prosecutor, in asking a conviction, said the case had been brought on public grounds, and the decision of his lordship would be regarded with wide-spread interest. Sheriff Cheyne said that the officers had asked for butter and were served with butterine, a very inferior article. Looking to the large proportion of foreign ingredients in this case, he must regard it as having been introduced with a fraudulent intention, and he therefore found the charge proved, and imposed a penalty of £5 and costs.

CONTRACTS OF URBAN SANITARY AUTHORITIES.

Eaton v. *Barker and others.*

An important decision, bearing upon the provision in Section 174 (1) of the Public Health Act, that 'every contract made by an Urban Authority, whereof the value or amount exceeds fifty pounds, shall be in writing, and sealed with the common seal of such authority', has been made by Mr. Justice Stephen in the case of *Eaton* v. *Basker and others*, tried in the Exchequer Division. Mr. Eaton is a medical man living at Grantham, and when an outbreak of scarlatina occurred in the neighbourhood in June 1878, he was appointed to attend the patients isolated in some hospital tents provided jointly by the sanitary authorities of the district. His fee was to be 5s. 3d. per tent per day, and at this rate his total remuneration amounted to £97 7s. 9d. The Town Council of Grantham, into whose district the other sanitary districts had meanwhile been merged, disputed this claim for some reason that did not appear, and offered a smaller sum. On being sued they urged that no contract was ever made, and that if it was made it was illegal under section 174 of the Public Health Act. At the trial a further question was raised as to whether the joint committee who arranged for Mr. Eaton's services were liable in their individual capacities; but this the judge decided without difficulty in the negative, saying that it was clear to him that the contract was made with the committee in their capacity as a committee. As to the other point, Mr. Justice Stephen observed:—It was contended for the plaintiff that Section 174 of the Public Health Act did not apply to contracts like the one between Mr. Eaton for personal service, but only for contracts for works, etc., and much might be said for that view but for the case of *Hunt* v. *the Wimbledon Local Board*. In that case, an architect made plans upon the verbal order of the surveyor of the Local Board, the charge for which exceeded £50, and it was held by Mr. Justice Lindley, and by the Court of Appeal subsequently, that the Board were not liable. The case appeared to him to show that Section 174 of the Public Health Act laid down a positive general rule subject to no exception, and applicable to all contracts made by Local Boards over the sum of £50, and on that ground he was reluctantly obliged to come to the conclusion that as the contract was not under seal it could not be enforced. It was attempted to be shown that the contract was not over £50 at the time it was made, but he was of the opinion that it became so as soon as that amount was reached by the attendances of Mr. Eaton. It was also argued that the contract was one made on an emergency, but he saw no reference to an emergency in the Act, and he thought it could easily have been drawn up—even after Mr. Eaton had entered upon the performance of his duties. Therefore there would be judgment for the defendants. With respect to the costs he had felt more difficulty, for he could not say that the defence set up commended itself to his approval. It appeared clear to him that the Board resisted a moderate demand for payment earned by a man who discharged a public duty at the risk of his health and practice. They founded their defence on a ground of the most technical character, and which had nothing to do with the merits of the case. He did not, however, feel himself at liberty on that account to deprive them of the costs to which in the order of things they were entitled. Judgment was therefore given for the defendants with costs.

LANDLORD AND TENANT.

Budd v. *Davidson.*

The Vice-Chancellor delivered judgment in this case. The question raised was one of great interest to persons taking leases of dwelling-houses.

His Lordship said the object of this action was to obtain specific performance of a contract entered into by the defendant to take a lease from the plaintiffs of a house in Riverdale Road, Twickenham. The lease was to be for 7, 14, or 21 years, from May 1879, at a rental of £130 per annum. Before entering into the agreement the defendant carefully examined the house and made inquiries as to the drainage, and the evidence on both sides agreed that he was told that it was on the cesspool system, and that it was good. The defendant also stated that he was told it was very good drainage. The defendant, being satisfied with the house in all respects, entered into possession of it on the 1st of May, 1879, and thereupon became bound to accept a lease in conformity with the contract. To induce the defendant to do this a correspondence of a very tedious description was commenced, which was carried on up to the 8th of October without any complaint being made by the defendant as to the drainage of the house. On the 13th of October the defendant sent the second quarter's rent, and for the first time complained of having had trouble with the drains, and that the sewage had overflowed into the basement of the house, and that in consequence thereof he should be compelled to remove his family to avoid a possible outbreak of typhoid fever. A surveyor was then sent by the plaintiffs to examine the drains, and he found them stopped up with hair and other rubbish, and, this being removed, the water and sewage flowed as usual. The surveyor, in his report, stated that there was not a sufficient fall in one portion of the drain; but this surveyor and another, who was also sent by the plaintiffs, were of opinion that, for a cesspool system of drainage, this drainage was perfectly good. After this cleansing of the drains, the defendant stated that they acted fairly well till April, when another overflow occurred, and again a search was made and a piece of flannel was discovered in the pipe, which was said to have stopped the flow.

At this time there occurred the difficulty about the pumping. It appeared that unless this pumping-up of the sewage was constantly kept on, either twice a week or, sometimes, every day, there was an overflow. It was said that the drains ought not to require pumping more than once in six months or a year; but this system evidently required the pumping to be very frequent, and at such periods the sewage was spread over the surrounding land, and there was evidence to show that the smell at such times was very offensive, and the house was rendered most uncomfortable. In July last there was a serious illness of one of the defendant's children, a little girl six years of age, who died, and three other inmates of the house were taken ill at the same time. The medical man who attended stated that the disease was diphtheria, and that this complaint usually arose from defective drainage, and he attributed the death of the child to that cause. Several witnesses spoke of the nuisance arising in the house from the bad smells. Mr. Baldwin Latham, C.E., examined the drainage, and stated that the fall was not sufficient, and that there was no ventilation whatever. The drainage, in fact, he said, was very bad, and necessitated frequent pumping, and he would not on any account live in such a house. Mr. Maynard alluded to the fact that there was no drain ventilation, and that the use of rain-pipes for that purpose was very dangerous, and that the drainage was altogether improper and the house not fit to live in. In the face of all this evidence it was impossible to come to the conclusion that the drainage was good, and certainly not very good, as represented to the defendant when he entered into the contract. There was no doubt that the defendant suffered great anxiety from the defective drainage, but whether the little girl died from the effect of the drainage it was impossible to determine; but it was not to be wondered at that the defendant should refuse any longer to reside in the house. His Lordship had come to the conclusion, upon the evidence, that the drainage was not very good, and, as far as he could judge, the whole defect arose from want of sufficient fall in the branch drain. In this state of things it had been insisted that whatever might be the difficulty connected with the drainage, the defendant had by laches, and by remaining so long in the house without making any complaints, and by regularly paying the rent all the time, and by his contract incapacitated himself from obtaining relief, and had bound himself to accept the lease. His Lordship therefore came to the decision that error in the representation having been made that the drainage was good, though made in the belief that such statement was true, there was an erroneous statement that disentitled the plaintiffs to the relief they sought, and the action for specific performance must therefore be dismissed; but, considering the great delay which had occurred on the part of the defendant in making complaints, it must be dismissed without costs. As to the rent of the house, he was of opinion that the defendant ought to pay rent up to September last, but he could not make any order for his paying it after the time he ceased to occupy the house.

The Chelsea Vestry have resolved that the parish mortuary in the old burial-ground in King's Road, shall be reconstructed, 'and made suitable to the requirements of the age,' and have requested the surveyor to submit plans and estimates for the purpose.

LEGAL NOTES AND QUERIES.

NURSES FOR INFECTIOUS CASES.

A domestic servant in a house in town is sent home to the cottage of her father, a farm labourer in the country, whilst suffering from small-pox. The Local Sanitary Authority, thinking it important to isolate the case as far as possible, instructs its Inspector of Nuisances to engage a person in the village to attend the case and to be the medium of communication between the infected house and the village. For this service, the Authority pays the attendant a certain sum of money, and it also pays the father, whom it is thought desirable to keep from work a short time, a small sum in lieu of wages, upon which he is entirely dependent. These measures prove satisfactory, no other case arising subsequently. But the payments have been disallowed by the auditor on the ground that they are not authorised by the Public Health Act. I should be glad of your advice on the legality of this decision.

RURAL M. O. H.

[Although under Section 131 of the Public Health Act it is competent for an Authority to provide a hospital for infectious diseases, and to employ such nurses as may be needed for the care of the sick in such hospital, they do not appear to have any power to provide nurses for sick persons, who are not paupers, at their own homes, or to pay the wages of any person who has been kept from following his employment through the presence of infectious disease in his house. This is one of the defects in the Public Health Act which has been removed in a number of Local Acts passed for the benefit of certain individual towns; and the subject will doubtless receive consideration in the next general Public Health Act. Looking to the equity of the case, the Local Government Board would probably be found willing to remit the disallowance of the auditor if appeal were made to them. It is possible, too, that the Authority, being a Rural Authority, might be able to pay these expenses in their capacity as guardians, under the power given to them by Section 28 of the Vaccination Act of 1867 'to pay out of their funds all reasonable expenses incurred by them in taking measures to prevent the spread of small-pox, and to promote vaccination upon any actual or expected outbreak of that disease.']

LAW OF LIGHT AND AIR.

AT a recent meeting of the Royal Institute of British Architects, Mr. T. Roger Smith offered the following suggestions as to rendering the above law less oppressive:—1. That (without destroying any existing methods of procedure in cases where persons might refuse or omit to take advantage of the provisions of the proposed Act, and without confiscating any rights of light) it ought to be enacted that any man about to build on vacant land, or rebuild to a greater height than before, may acquire the right to do so, notwithstanding that he interferes with ancient lights, subject to two conditions, first, his giving due previous notice; second, his paying adequate compensation. It is also suggested that some provision should be made for, to some extent, defining, either by schedule or by means of rules to be framed by the judges or vice-chancellors, the rights that are possessed by the owners of ancient lights. 2. To carry out the first part of this proposal, some such provision as the

following should be made: The building owner, who gives no notice of his intentions, should have no benefit from the Act; he who wishes to take advantage of it must, before beginning to build, notify his intention to go higher than before by advertisement, and by notice affixed to the building, and by deposit of plans in some neighbouring public place; for a definite period (probably about two months would suffice, but say three) he should acquire no right to go higher than before; if no protest is lodged at the end of this time, he is to have a right to carry out his deposited plan; within the period of this notice, any owner of a dominant tenement may lodge a protest, and such owner is to be at liberty in the protest to make a claim; if the building owner pays this claim, he is to be at liberty to go on so far as the rights of this tenement go, having compensated the owner; if he pays the amount into the Court of Chancery, and causes a survey of the buildings to be made before any light is interfered with, he is also to be at liberty to go on, subject to the result of an inquiry; if he declines either of these courses, he is not to be at liberty to go on beyond the old height till an inquiry has been held and the compensation been assessed and paid. The mode of making such inquiries would best be subject to the direction of the Court of Chancery. The expenses, should, of course, be borne by the building owner, and the usual 10 per cent. for compulsory sale should be added.

SMALL *v.* LARGE SEWERS.

A case which will interest many of our readers has just been the subject of an appeal to the Metropolitan Board of Works. A new road on the south side of Battersea Park is being formed by Mr. Kelly, the lessee from H.M. Commissioners of Public Works and Buildings. The length of the road is about 800 feet, and it is proposed to erect on each side thereof about 30 eight or ten-roomed houses. Three applications had been made to the Wandsworth District Board of Works, to approve respectively a 12-inch, 15-inch, and 18-inch stoneware pipe sewer, but all were refused, the Local Board requiring a 3ft. 6in. and 2ft. eggshaped brick sewer encased into concrete.

The appeal against this requirement was conducted by Mr. Ernest Turner, F.R.I.B.A. of Regent Street, who argued that a sewer of this size was enormously in excess of what was necessary, and moreover that large sewers for the drainage of small areas were most objectionable upon sanitary grounds, and altogether at variance from the teachings of modern sanitary science, and the general principles and more recent practice of the Metropolitan Board of Works.

Mr. Corsellis, solicitor, appeared for the Wandsworth Board. The appeal was allowed, the Metropolitan Board of Works intimating that they would approve the use of 18-in. pipes.

REVIEWS.

The Laws relating to Quarantine. By Sir SHERSTON BAKER, Bart. London: C. Kegan Paul and Co.

THE recent appearance of plague in Mesopotamia has not at present led to any of those vagaries of quarantine which were indulged in after the outbreak of plague in the province of Astrakhan some time ago; but looking to the extraordinary disabilities imposed upon commerce by various European nations upon the news of that outbreak, there is no knowing to what lengths in the matter of quarantine Governments may unthinkingly go. This is not the place to discuss the principle of quarantine. It is based upon traditions of medicine in bygone days, and our experience of it in this country has been such as to show its utter futility as a precautionary measure against the invasion of disease. It is retained upon our statute-book solely for the purpose of avoiding certain disabilities to which our vessels would otherwise be subject in countries where quarantine is held to be an essential element in disease prevention.

Few people, probably, are aware of the obsolete and barbarous precautions of our English Quarantine Act of 1825, which, though still unrepealed, would be absolutely impossible of enforcement under the present conditions of society. The ignorant may now have an opportunity of reading it in Sir Sherston Baker's book, and of pondering on what the real effect of its attempted enforcement would be. Quarantine, indeed, must be held to be a delusion of bygone times. Whether foreign countries will ever come to share this belief, and whether quarantine will ever come to be settled on an international basis, are questions of the future. Each state does, as regards quarantine, what is good in its own eyes, to the infinite derangement of commerce and the despair of sanitary reformers.

Sir Sherston Baker has aimed at making his book a work of international reference, and for this purpose he has given, as far as possible, the regulations of every foreign country, and of all our colonies, with regard to quarantine. He professes to have had great difficulty in getting information as to foreign states, and he bewails the task which the translation of their laws has entailed upon him as author. He does not, however, make the very smallest reference to the abstract of regulations respecting quarantine made by Dr. Gavin Milroy in 1860, from which page after page of his book has been copied bodily. Very nearly the whole of Chapter VII (pp. 266-335) of the book, which gives abstracts of the regulations in the British Possessions, is word for word the same as Dr. Milroy's abstract, even the peculiarities of language in the latter being preserved. The same thing may be said with equal truth of Chapter IX (pp. 379-538), containing the laws and regulations of foreign countries. Sir Sherston Baker is of course at perfect liberty to make use of any document he pleases in preparing his abstracts; but it is hardly fair to bemoan at the commencement the difficulties of translation, and then to go on, page after page, country after country, reproducing, without the smallest acknowledgment, and without giving the most distant hint that it is any other than his own work, the *ipsissima verba* of Dr. Milroy. The whole volume, indeed, useful as it undoubtedly will be, as containing within one cover all the information on the subject, is a remarkable specimen of success in 'padding out' a book. Chapters I and II, containing definitions of 'quarantine', 'lazarets', 'pratique', 'bills of health', and so forth, and to a certain extent the compiler's own work, only occupy fifteen pages. A complete reprint of the Act of 1825, and of the Orders of Council made under it, bring us to page 130. Nearly the whole of the Public Health Act, 1875 (the reproduction of which must surely be unnecessary), comes next, and occupies 130 more pages. The abstract of colonial regulations (borrowed in great part from Dr. Milroy) follows, a reprint of the International Sanitary Convention of 1852 coming between it and the abstract of foreign regulations (much of which is also taken from Dr. Milroy). The book concludes with some remarks as to the Port of

London, the qualifications and duties of Port Medical Officers and Sanitary Inspectors, etc., taken bodily from one of Mr. Harry Leach's reports, also without acknowledgment. It must be confessed that this method of running up a book to 564 pages is by no means satisfactory.

If Sir Sherston Baker had been content with the title of compiler, and had acknowledged his indebtedness to others, the case would have been different. But he is even obtrusive of his capacity of author, and thus allows the book to be published on a distinctly wrong issue. We would earnestly recommend him to be careful in future publications to acknowledge the source of his information.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE BOARDING-OUT OF PAUPER CHILDREN.

On behalf of our pauper children, in all sincerity, I have to thank you for publishing the results of eighteen years' experience of the boarding-out the orphan and deserted children of the Cork Workhouse, which proves beyond the power of contradiction that those little ones, when transferred from a workhouse to the health-giving home in the country, do not die off like 'bubbles in the stream', or pine in the hospital, but grow up to be healthy members of society, with strong limbs and bodies, able and willing to earn their bread in that sphere of life which the Divine Architect of the Universe has been pleased to place them. This is the result of the efforts of the Cork Board of Guardians. No doubt the surroundings of the district of the union present great opportunities for placing infants and children, whether delicate or strong, in favourable localities, as it possesses all the various atmospheres of the sea, mountain, and the more genial temperature in the sheltered districts, and, as those children who are legally qualified to be boarded-out are duly certified as fit by the medical officer and the master of the workhouse, the most suitable place is then selected for them, where their health is most likely to improve; this is the primary consideration; secure this, and all other requirements will follow, education, industrial training, etc. This has been done most effectually, and the problem has been solved, how to preserve the lives of workhouse children, and the answer is, send them to the country in charge of careful and attentive nurses, when it will be found that the children will not die off as they do in the workhouse.

May I ask your support in favour of extending of the provisions of the boarding-out Act of Parliament to all other workhouse children, especially those whose parents are blind, lunatics, permanently disabled and incapable of supporting their children, and who are compelled to live in workhouses. The question is one of great national importance; it is one which cuts at the very root of pauperism, and will no doubt attract many friends of those children in support of the project; while, at the same time, we must be prepared to withstand the opposition which may be raised by Poor-law officers, the boarding-out system requires no additional staff, while the 'boarding-in' maintains an army of well paid officials, and, no doubt, every objection which can be raised to reduce pauperism will be thrown in the way to obstruct and prevent the extension of the Act. Let, however, a beginning be made with some more of the various classes of children, take those I have specified, such as the children of the blind, lunatics, and permanently disabled paupers, what possible objection can be made to remove them from the workhouse, and are not their lives as valuable as that of the orphan or deserted child? All have practically lost their parents, and while the law places the responsibility of protecting their lives on Boards of Guardians, the law is bound to afford those boards the power of doing so, in that way which has proved to be more economical and judicious, both for the child and the ratepayer; and, in that way, which is strictly in accordance with the plan originated by the Almighty, and that is the 'family system'.

May I venture to repeat the hope that, through your influence, some of our members of Parliament may be induced to take up the question with the view of getting the Act extended, as far as practical, to all other workhouse children.

WM. D'ESTERRE PARKER.

Passage West, Cork, March 24th, 1881.

ABSOLUTE SAFETY FROM KITCHEN BOILER EXPLOSIONS.

In your issue of February 15th the article 'Sanitary Inventions' contains a description of apparatus to ensure 'Absolute Safety from Kitchen Boiler Explosions'. Now the system described is by no means admitted by practical men to be superior to all other systems, but the merits of the systems I will discuss in another letter. The point I wish to be enlightened upon, and no doubt many others are equally desirous of knowing is, of what is Mr. Dyer the patentee and sole manufacturer? The article says:—'The system described was first introduced into England by the patentee in the year 1868'; then, after the description, it is stated that:—'The patentee and sole manufacturer is Mr. F. Dyer, of 66, High St., Camden Town, London, N.W.' Does it mean that Mr. Dyer is the patentee and sole manufacturer of the boiler, or of the cylinder, or of the safety-valve; or does he claim to be the patentee and sole manufacturer of the system? I, myself, have bought boilers, cylinders, safety-valves, and tube, and fitted up apparatus both on this system, which is 'simply perfect', and on another system, which I suppose was not perfect, but which, somehow, works quite as satisfactorily as the 'perfect system', and more so. Boilers, cylinders, safety-valves, and tubes can be bought in any quantity in Thames Street and many other places, and I know many hot-water fitters who make use of the one-pipe system; therefore I am at a loss to know of what Mr. Dyer is the patentee and sole manufacturer. If he will kindly enlighten me on this point he will confer a favour on FREDERICK BALL.

95, Edgware Road, March 22nd, 1881.

IMPROVED METHODS OF DRAWING OFF THE PRODUCTS OF COMBUSTION AND HEAT ARISING FROM GAS.

Various methods for carrying out this object have been attempted. In rooms or halls heated by hot-water pipes or by warm air, it is easier to get a constant up-current in the outlet tubes than where there are fires, the chimneys of which tend to draw air towards them from all openings in the room, and unless the up-current in the outlet tube of the gasalier is

powerful enough to counteract this effect of the chimney, there will sometimes be a down-draught in the intended outlet tube of the gasalier, and especially if only one of the gas jets is lighted. This tendency at times to down-draught is apt to happen all the more readily when the same tube which ventilates the room is also made to serve as the outlet ventilation pipe for gas jets. To obviate this, and when it was desired to carry off the products of gas combustion to the outer air, I found it was necessary, in order to get good results, to put in a separate and special pipe all the way up to the outer air for the ventilating tubes of the gaslights *per se*. I here show two of my plans as designed by me and shown in my patent of July 9th, 1878. The small diagram, Fig. 1, is the plan I used in my own house two years ago. Fig. 2 shows a plan of the *same ventilator* serving for both ventilating pipe for room and the ventilating pipes for gasalier, *but keeping the two distinct*, so that supposing a blow down, short or long, did take place in the tube C, it would not affect the proper outward current of the foul air in the tube D. To ensure an immediate upward current in the small ventilating gasalier tubes, I generally found it necessary—especially when a fire was on—to open the window for a few seconds; and to keep up this outward current, I found it advisable to have both gas jets lighted, or if not, then in some states of the weather, as during a cold calm, *e.g.*, the foul air went up the one small tube and came down the other: valves or cranes might be put on to prevent this, or a sufficiently large supply of air being given to the chimney in such a way as to prevent it pulling part of its supply down from the ventilating tube of the gasalier.

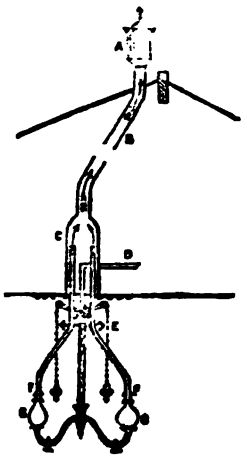


Fig. 1.

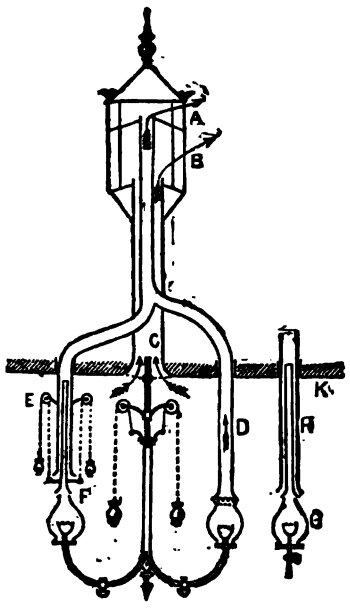


Fig. 2.

With the single tubes FF in Fig. 1, although the products of gas combustion are carried off, a certain amount of heat is radiated from off the warm tubes into the room. In winter this is not likely to be an objection, as people wish for heat, only they do not wish for vitiated air. So that, so long as the vitiated air goes up the ventilating tubes, any little heat they may throw off is not likely to be objected to, and more especially if a supply of fresh air is coming into the room. In 1878 I referred to condensed vapour caps; these may be applied just above the ceiling in C, and also at the bottom of the tubes FF if wished.

This is a subject which is open to be better worked out practically than it has yet been, so far as I am aware.

W. P. BUCHAN, S.E., F.S.Sc. (Lond.)
21, Renfrew Street, Glasgow.

FLUSH-TANKS.

My attention having been called to a letter from Mr. Rogers Field's agents, published in your last number, I observe that those gentlemen have omitted the important words, 'without its having been cleaned', in the evidence they adduced as to the use of the annual syphon, 'with unscreened sewage'.

It was not for such evidence as this that I asked at the Exeter Congress, because it had been previously published; and I have yet to learn that unscreened sewage has passed through an annular syphon for any given period without the syphon requiring to be cleaned; but, from a repetition of what I had heard before, with a studied avoidance of the essential point of my question, I can only infer that no satisfactory evidence is forthcoming thereon.

My own knowledge of the ways of unscreened sewage led me to expect this barren return to my question, but I was not prepared for the following experience which has extended my distrust of the ingenious annular syphon, even when used with screened sewage, or anything except pure water. I was taken one day, by a firm believer in the annular syphon, to see it at work with a tank to which rain and cistern-water alone had access without sewage, screened or unscreened.

A tap was turned on from the cistern, and I climbed on the edge of the tank, in rather a confined situation, in the firm faith that I should see it fill up and discharge regularly, like the glass models shown at sanitary exhibitions. However, after watching for a few minutes, I observed that the level of water in the tank failed to rise, and, attracted by a sound of running water, I looked over the side of the tank, and saw the water running down a drain over which there happened to be a grating, just as fast as it was falling into the partially-filled tank from the tap which had been turned on for my edification. When I turned round to tell my friend what I had seen he appeared incredulous; but, after he had taken my place on the tank, he could doubt no longer, and at once told me that some leaf or floating matter had stopped the syphon-action, and explained that he, himself, had invented a contrivance with a small lead pipe to obviate such occurrences, but that, by some mistake, it had not been fitted to this particular tank.

On the whole, therefore, as I said at Exeter, the form of flush-tank called 'Shone's hydraulic ejector', discharging the whole of its contents, liquid, sediment, and solids, by a smooth, round pipe, of any desired diameter, leading from the bottom of the tank by a syphon-bend, which is rendered absolutely certain in its action by the momentary superior head of water discharged into the tank from a simple tumbling-box or basin, is manifestly superior for all practical, sanitary, and economical reasons to any of the flush-tanks invented by Mr. Rogers Field.

We can thus dispense with all the complications

of weir and annular syphon, with its sharp edges and narrow water-way, for rags and miscellaneous sewer products, to say nothing of the 'small lead pipe', and such-like contrivances for securing a regular intermittent discharge by gushes.

Mr. Rogers Field deserves great credit for his efforts to bring prominently before the public the need of automatic flushing for sewers on a flat gradient, and it may seem hard to him to acknowledge that his edifice has been crowned by another inventor; but it appears impossible to shut one's eyes to the facts which I have attempted to describe in my paper at Exeter, and in this letter.

ALFRED S. JONES.

Havod-y-wern Farm, Wrexham.

SANITARY INVENTIONS.

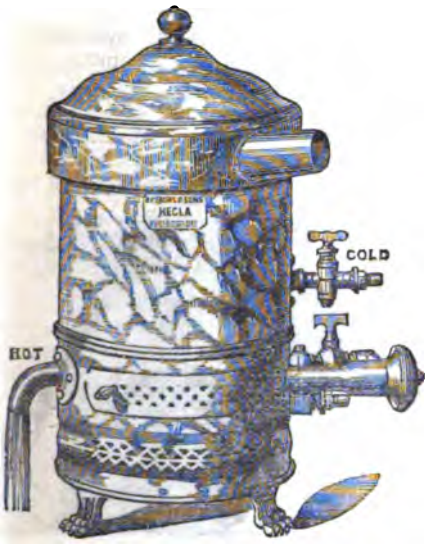
GAS IN ITS APPLICATION TO THE HEATING OF BATHS.

The distressing accidents that have recently occurred through the use of gas for heating water in bath rooms, has caused a panic amongst those who have been accustomed to use it, and the manufacturers of the gas baths have wisely been making inquiries into the effect of their apparatus under given conditions and experiments as to the result of their working. As usual, when serious accidents occur, a flood of correspondence has appeared in the daily prints and trade journals on the subject, arguments *pro* and *con* have been advanced, and, in one or two instances, a wholesale condemnation of gas-baths has been urged. While we are desirous of safe-guarding the public by every item of knowledge we possess against any possible danger, we are not disposed to utterly depreciate these useful agents.

We would ask those who indiscriminately condemn on the spur of the moment, if they have taken the trouble to inquire how many years gas baths have been in use, how many hundreds are at this moment being daily made use of in London alone, and what number of accidents have occurred since their introduction. Again, it would not be difficult to show that every one of the fatal occurrences that have happened could be traced to sheer neglect, and an utter disregard of the most simple laws of science. It is now about thirty years since baths with a boiler on the flow-and-return principle heated by gas were first introduced, one of the earliest makers being Messrs. Smith and Phillips, a firm now extinct. Since that time Messrs. Wilson, Wardour Street, and B. Perkins and Son, Bell Court, Cannon Street, E.C., and other manufacturers, have yearly added to the output, and although the production has been mainly confined to the Metropolis, nearly every maker of gas apparatus in the country now manufactures his gas-bath. To attempt to obtain the number that have up to the present been sold, would be difficult and quite unnecessary, as we possess sufficient information for our purpose. To give an idea, Messrs. B. Perkins and Son had, up to a fortnight since, sent out 1,640 of their gas-baths, and to show the rapid increase in the sale of late years, we may further mention that since June 1873, when their atmospheric burner was introduced, no less than 860 of the baths have been sold, so that more than half of the quantity made by this firm have been sent out in less than eight years, and the number is increasing weekly. When we consider that some other makers have manufactured a proportionate quantity in the same time, it is palpably clear there must be some thousands of these articles in use in the kingdom; and, again, it may be asked how many accidents of the kind complained of have there been since their introduction? We append an engraving of Messrs. Perkins and Son's gas-bath with their patent 'Trident' atmospheric burner, which is made on scientific princi-

ples, producing, as we shall presently show, perfect combustion, and from the peculiar construction of the boiler, heating the water in a very short space of time. All parts exposed to wear in the boiler are made of copper, and the best materials generally are used in making it, and Messrs. Perkins vouch for the fact that out of the large number they have sold, extending over a quarter of a century, they have never had a single complaint to the detriment of their burner. On the last fatal accident from using a gas-bath becoming known, the firm naturally considered that a certain amount of responsibility rested upon manufacturers generally who were makers of such apparatus, notwithstanding that they considered the distressing event in question was due to sheer neglect; and feeling that, as large purveyors of the article that was being condemned broadcast, it was incumbent upon them, for the safety of the public and for their own satisfaction, to have their burner thoroughly tested, with a view, if necessary, of either having alterations made in it, or even discarding it altogether, they at once placed a heater and burner in the hands of Messrs. Wigner and Harland, of Great Tower Street, the public analysts and gas examiners to most of the London Gas Companies; and, after careful and exhaustive trials, their report, of which the following is a copy, says, "We have analysed the products of combustion given off by your 'Hecla Water-heater.' We find that the gas is *perfectly* burned, and that *no* carbonic oxide is given off when used either *with or without a flue*. The gases produced are the same as those which are found during the burning of coal gas in an ordinary gas-burner for illuminating purposes, and consequently the apparatus does not produce the unpleasant smell so common in instantaneous water-heaters. (Signed) G. W. Wigner and R. H. Harland." This report, it will be seen, effectually disposes of the argument so rashly put forth by some, that, '*Every* atmospheric burner gave off carbonic oxide.' An engraving of the 'Hecla' heater is appended, and, we may add, that during the time the first trials were being conducted with the original one without a flue, Messrs. Perkins perfected their new one with a flue, which afterwards underwent the same course of treatment, and it was found that both are free from that deleterious gas, 'carbonic oxide,' which has proved itself a deadly poison. One fact, however, that adds to the value of the one with a flue came out during the experiment, viz., that it heated the water some twenty per cent. quicker than the one without that appendage. We may further add that the 'Hecla' is made to heat one quart of water to 175 deg. Fahr. per minute, one and a half gallons at 100 deg. per minute, starting at a temperature

of 60 deg., or a warm bath in twenty minutes. In concluding our remarks on this apparatus as against others whose burners have not been so publicly tested, we recommend all those using gas-baths without flues, and where good ventilation in the



room is not provided for, to open the window at top and bottom an inch or two during the time the water is being heated. When the gas is turned out the window may be closed, and this will in all cases be found sufficient to materially neutralise the effects of the worst constructed burner in use, though in all cases we recommend that the best constructed burners be used; had this simple safeguard been carried out, the unfortunate persons who came to so untimely an end a few weeks since, might have been alive at the present moment.

(*To be continued.*)

SMITH AND STEVENS'S OPEN FIRE-GRATE.

An open fire-grate, containing some novel arrangements, has been introduced by Messrs. Archibald Smith and Stevens, of Leicester Square, and though it may possibly receive some modifications, there is sufficient originality about it to warrant us in describing it at once. Its general appearance differs but little from an ordinary register grate, excepting in the fire-basket. It is set in the usual opening, which is secured as an air-chamber for receiving cold air from the outside, and emitting it eventually into the apartment warmed, by means of openings in the front, forming part of the pattern designed upon it. It is self-feeding, holding about a half-hundredweight of fuel, the holder or hopper being directly over the front opening, and it burns anthracite or common steam coal. It has the advantage of combining two principles, viz., slow combustion or quick draught, either of which can at once be put into action by the drawing in or out of a knob connected with a valve or diaphragm plate. As burning anthracite coal is presumed to require a quicker draught than the bituminous variety, this is provided for by extending the fire-holder considerably in advance of the front, and, being pivoted, it has a natural tendency, if left to itself, to fall back, and so reduce the size of the fire. This is, however, prevented by a gauge chain, fixed to the front of the basket, and secured to the hearth-plate, which enables the size of the fire to be regulated at pleasure. This grate is composed of three sections, and has a canopied front, the knob for regulating the diaphragm being at the middle of the canopy, and above that the removable door for filling the hopper. By opening the valve the draught passes up directly in front of the fire, making it a slow combustion stove, and by closing it, it is sent through the fire and into a vertical chimney, producing a quick draught, the interstice between the two chambers, which converge into the same chimney, being the fuel-holder. In this invention we have a grate holding sufficient coal for nearly forty-eight hours consumption, if economically worked, giving off no smoke, and burning a fuel costing less than the ordinary bituminous coal. It can be seen at work daily on the premises of the inventors, at the address given above.

PEARSON'S PATENT TRAPLESS 'TWIN BASIN' WATER-CLOSET.

We cannot too often impress upon our readers the necessity of closely watching all improvements that from time to time are introduced in connection with closets or drains, and so far as they reasonably can to take advantage of them. We are induced to make these few observations in connection with the above mentioned closet, which has a not uninteresting history of its own, and of a patent connecting joint, that cannot be made known too widely. A well-known firm of drapers and silk mercers in Gracechurch Street (Messrs. Capper, Sons, and Co.) some years since were very much troubled with this portion of their sanitary arrangements. Their premises, which from time to time had been added to, were, like most of the old property in the City, closely built, more than two hundred *employés* were living on the premises, and the proprietors, whose liberality was generally admitted, had adopted the best methods known to them for improving their closet and drain service. But despite their efforts, some of the assistants were always ailing. The medical man was consequently in requisition, and altogether the state of things was unsatisfactory. At length the firm managed, with the assistance of Mr. Pearson, to invent the 'Trapless Twin Basin Closet', and as if by magic their troubles ceased. It is now six years since they adopted this invention. The closets are fixed on their premises, in some cases in the most confined places, fifteen of them being in use; and we can from personal inspection vouch for the entire absence of any unpleasant odours arising from them. The closet is of the most simple construction, the word 'twin' being applied to it from its having a second vessel or chamber adjoining the pan, forming the supply chamber, all being of the best earthenware. There is always a good body of water in the pan, and traps, cranks, fly-pan, etc., and all complex work, is entirely dispensed with. The only thing approaching a valve is the plug itself, which on being lifted communicates with the drain direct, and is hermetically sealed by means of a solid plunger with India-rubber washers, that can be renewed from time to time. The only plumbing work required is a few inches of pipe to make the connection with the water service-pipe. It has been argued generally that no trapless closet will prevent the emission of sewer gas, but this certainly does not apply to the 'Twin Basin', and so successful have they proved in actual work, that Messrs. Capper determined to open a department for their manufacture and sale, and a

large and constantly increasing demand has been the result of the venture. In connection with this closet, and an appendage only second in importance to the closet itself, is a patent joint, the invention of Mr. Brian Jones, another gentleman connected with the firm. The one part forms the finish of the lower, or outlet pipe, of the closet, and is in shape like an inverted basin, having a hollow orifice on the inside to drop over the soil pipe, which is brought up about two inches above the flooring boards, with a broad flange laying on them. The orifice drops over the pipe, which is thus secured between two thick walls of earthenware, the interstice being filled in with a specially prepared current, so that nothing short of breakage of the ware itself can destroy it. This application effectually prevents any inroad from vermin or natural causes. The joint is also arranged in some cases in an inverse manner, the canal or orifice being made at the finish of the soil pipe, and the outlet pipe of the closet placed in it. In either case, the closet pipe is finished with a bold flange of earthenware to lay on the floor.

WARNER AND SONS' IMPROVED PAN-CLOSET.

Another closet which has gained considerable popularity, and which has recently been brought more prominently before us is Warner and Sons (Jewin Crescent, Cripplegate) Improved Pan-Closet, originally introduced by the firm in the year 1872, when its success was so marked that many imitations of it have since appeared. Its most prominent feature is that the container, or bottom receiver, is made of pottery in place of the usual one of cast-iron, thus the principal objection to pan-closets, viz., the corrosion of the container at the bottom portion, by means of rust, and the action of the excreta passing through is entirely avoided, and effluvia and noxious vapours which rise, particularly in warm weather, when the handle is lifted, is effectually prevented. From a sanitary point of view, this is a great gain.

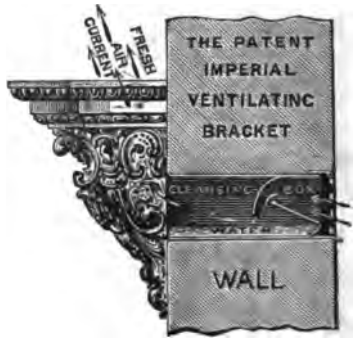
The cover of the container is made of galvanised iron, and the brass-working parts are attached to it, which leaves little chance of the container being broken. Having seen these closets in use, we can testify to their perfect cleanliness and to the entire absence of any unpleasant smells.

In the year 1876, Mr. E. G. Banner, C.E., whose system of ventilation is well known to sanitarians, fixed twenty-four of these closets in Guy's Hospital, in connection with his mode of ventilating drains and soil-pipes, dispensing with D traps. A communication has recently been received by Messrs. Warner and Sons from Mr. Banner, stating that these closets have been in constant use ever since, and continue to answer their purpose in a most satisfactory manner; a proof that both closet and the system of ventilation are effectual in their essential points.

THE 'IMPERIAL' VENTILATING BRACKET.

Among the many productions of the Sanitary Engineering and Ventilating Company, Victoria Street, S.W., the 'Imperial' Ventilating Bracket is one of the latest and deserves commendation.

This contrivance is an ornamental bracket concealing the aperture through which a regulated supply of



fresh and filtered air enters the apartment without draught, and is so arranged that it can be fixed to the wall or made to fit in a corner of the room. This bracket can be manufactured in elaborate designs or perfectly plain, in keeping with the other furniture of the apartment. The bracket is sufficiently large to hold a vase, bust or other ornament, and thus affords an effectual means of ventilation combined with mural decoration.

The Sanitary Engineering and Ventilating Company's Imperial Ventilating Tubes and fixed Exhaust Ventilators are also to be seen in operation at their premises, Victoria Street, S.W.

ENAMEL FOR DAMP WALLS.

At this time of year, when painting, renovating, etc., is generally being carried out, and the inroads that winter often makes in our houses have to be repaired, an article that will render damp walls impervious is a boon that cannot be too highly estimated. Such an agent is to be found in the 'Instanter' enamel, manufactured by Messrs. Beniams and Co., 52, Southwark Bridge Road, S.E., which, we have reason to believe is a most excellent preventive of damp, and a complete eradicator of the nuisance. Houses built of soft, porous stone, or brick, or in exposed situations, basements, outbuildings, etc., wherever damp usually makes its appearance, should have a coating of this enamel, which, it is confidently asserted, will render walls impervious to it for years. So rapid is it in action, that walls may be painted, distempered, or papered over in ten minutes after its application, and, being almost colourless, it does not materially alter the appearance of exterior walls, except that it gives them the effect of having been varnished. One coating for this purpose is generally found sufficient, but with two they obtain the hardness and brilliancy of glazed earthenware in about two hours. This enamel is so moderate in price that it is within the means of all persons likely to require such a medium. Another useful invention of the firm is 'Alkahest', a paint

solvent for removing old paint or varnish, and intended to dispense with the inconvenient and risky operation of removing with the hand-stone, as no injury can accrue to the under surface, or detriment to the new paint or varnish to be afterwards applied.

BARNARD, BISHOP, AND BARNARD'S SLOW COMBUSTION STOVES.

The well-known grievance attaching to the ordinary grate, that more heat passes up the chimney than is radiated into the room, has been grappled with and overcome by Messrs. Barnard, Bishop, and Barnard, of Norwich and Queen Victoria Street, by their system of slow combustion stoves. The peculiarity of their grates or stoves is that they are without gratings underneath. The whole bottom and back of the stove is filled in solidly with fire-bricks, so that the air is obliged to pass through the fuel at the front bars. To render this system effective, the height or front of the stove is greatly increased, whilst the depth from front to back is much diminished. This produces a very large surface of hot fuel presented to the room, whilst all the radiation, at present thrown downwards on the hearth, is now thrown outwards into the room. As the fire has no open space underneath, everything gets consumed, only the ash falling out in front into a suitable ash-pan. A blower or sliding-shutter is fitted to their stoves by Messrs. Barnard, Bishop, and Barnard, so as to obviate the necessity for poking the fire. Should the fire be dull, all that is required is to lower the blower, and a bright and cheerful fire will be the immediate result. These blowers are very useful fittings, inasmuch as they will enable anthracite, coke, or inferior fuel to be readily burnt, and ensure a bright fire in a few minutes from lighting. They are also said to be the best cure for a smoky chimney.

In the very latest improved pattern, Dr. Bartlett's patent vertical bars are substituted for the usual horizontal ones in these stoves. The lower part of the bars are thrown forward in a bulge, so that the fire there will actually throw its heat upwards, and thus prove exceptionally efficient.

The economy of fuel resulting from the use of these stoves is very large, amounting to 40 or 50 per cent., with a greater heat, and they seem to require little care or attention, remaining brighter longer than the other ordinary grates, and consuming, as we have already noted, any class of fuel. The prices are so exceedingly moderate as to be within the reach of any householder desiring economy in fuel, and a well-warmed house. Yet great attention has been paid to the ornamentation of these stoves. To use a hackneyed, but expressive phrase, they are equally fit for the palace or the cottage, and, indeed, are so used, as they are patronised by H.R.H. the Prince of Wales, who has several fitted at Sandringham, and by many of our not too-highly paid country clergymen. In fact, for a combination of economy, efficiency, simplicity, and elegance, we know of nothing superior to Messrs. Barnard, Bishop, and Barnard's slow-combustion stoves. They are to be seen in large variety at their show-rooms in Queen Victoria Street, and are well worthy of inspection by persons intending to alter their arrangements for warming their rooms, for reasons of economy or fashion.

DIETETIC NOVELTIES.

THE PURE FOOD COMPANY'S PREPARATIONS.

We have received for trial a variety of preparations, made by the Pure Food Company, consisting of beef-tea in various forms, milk food, and extracts of coffee. Examination has shown that the solidified or concentrated beef-tea is the product of extraction under pressure of meat without bones. It readily dissolves in hot water, and forms clear beef-tea of excellent flavour and quality, quite equal to home-made beef-tea. The concentrated albuminous beef-tea consists of the above preparation, with the addition of a considerable quantity of the albumen of the meat-juice. It is quite free from fibrin or fat, and yields an agreeable, nourishing, and stimulating beverage. The solidified beef-tea with arrowroot is composed of a basis of concentrated clear beef-tea; but it contains, in addition, a small proportion of arrowroot thoroughly cooked. The essence of beef or beef-juice is the juice which results when beef is stewed without the addition of water. It contains all the soluble salts of beef, without albumen; it consequently possesses valuable invigorating and appetising properties, and is likely to prove of great service to invalids, or persons recovering from severe illness. The three milk-foods of the Pure Food Company are, milk-food for infants, milk-food for children and invalids, and pulsella. The first of these is especially made for infants, and is quite free from starch. It is well known that during the first few months of existence infants have not the power of dissolving starch, owing to the absence of the ptyaline from the pancreatic secretion, and that therefore starch, cooked or raw, will pass through their intestinal canal like sawdust, producing irritation and diarrhœa. Liebeg, in introducing the excellent food which bears his name, attempted to convert the starch into soluble saccharine matters; but the important part of the process, viz., the conversion itself, was left to the mothers or servants preparing the food. In the Pure Food Company's milk-food for infants, the conversion is already effected. In addition, it contains an amount of milk-solids proportionate to the quantity of milk requisite to make up the food ready for use. It is, therefore, a combination of Liebig's food, ready-made, and of the various milk-foods which have latterly come much into use, but which are said to contain much starch. This food, therefore, ought to be well adapted for infants, and it is very nourishing, palatable, and digestible. The milk-food for children and invalids contains some of the starch in the unconverted state, in addition to saccharine matter produced from starch, and a considerable proportion of milk-solids. Pulsella is the name given to a similar malted milk-food prepared with Egyptian lentils. The nature of the compound consequently makes it highly nitrogenous and nourishing. The preparations of coffee manufactured by the Pure Food Company which we have tried are their extract of coffee and extract of coffee with chicory. The former is a preparation of really excellent quality, the flavour and aroma of the freshly roasted berry being retained in their entirety. It is particularly free from the chicoraceous and burnt flavour which characterises other extracts. For those who have a preference for coffee mixed with chicory, and for such as require a more economical beverage, the extract of coffee with chicory is pre-

pared, and is as good as coffee spoiled by chicory can be.

We recommend all these preparations enumerated with the greatest confidence, both from the scientific method of their preparation, and from the respectively fresh and agreeable flavour which has been maintained throughout, and which is frequently lost in the preparation of preserved foods. The foods commented on are manufactured and to be had at the Pure Food Company's Laboratory, 4, Princes Street, Red Lion Square, Holborn, W.C., London.

ILLUSTRATED SANITARY PATENTS.

3016. (1880.) BASINS OR BOWLS FOR LAVATORIES, ETC.: C. F. CLARK, WOLVERHAMPTON. [6d.]—Consists of certain improvements in tip-up and plug basins, urinals, etc. whereby the sides of the basin or other article are

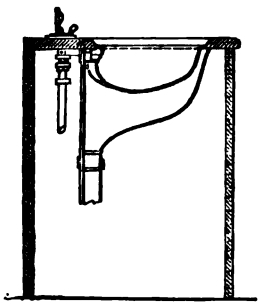


FIG. 2.

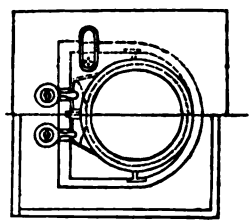


FIG. 1.

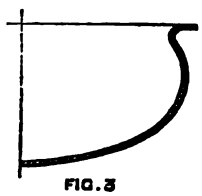
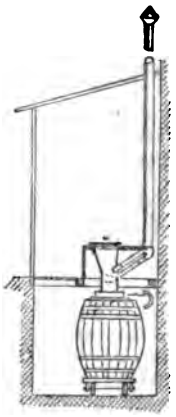


FIG. 3

formed to curve inwards as they rise towards the upper edge. This inward curve is continued to nearly the top of the basin or other article, when it changes into a smaller curve of contrary flexure, from the upper curve of which another curve of greater radius, or a straight line, completes the inner contour of the basin or other article to the outer top edge thereof. Water is thus prevented from splashing over the side of the basin, as the inward curve throws any water splashing up back towards the middle of the basin. The rounded part formed by the curve of contrary flexure prevents an inside sharp edge from being exposed to any person using the article. The interior curved contour renders the article convenient for being cleaned. In the case of a 'plug' basin to which the lip may be applied a container will be required to receive the overflow and splash from the lip, as in the case of a 'tip up' basin. The overflow from the lip may be used to wash over a urinal plate, constructed beyond the lip, and forming the back thereof, or otherwise used in conjunction with the basin.

3238. (1880.) PAIL OR TUB CLOSETS: C. KESSELER, BERLIN. [6d.]—Consists of improvements in pail or tub closets without water flush, and intended to render these of a ventilated and inodorous character. The hopper is mostly of the usual form. The down outlet pipe below is made in one piece, and has a set off behind, so as to prevent the adhesion of the excrements. In the back of the hopper basin there is an air circulation pipe connected to an air shaft. Below the air pipe there are two ventilating pipes entering the down outlet pipe, and proceeding in an upward slanting direction to the air shaft, which reaches up above the roof, and is provided with a cowl. The bottom edge of the down pipe has a projecting flange, with a groove for receiving a packing ring of some

FIG. 1.



suitable joint packing, serving to make joint between the pipe and an outlet sliding sleeve, which again makes joint with the pail or tub receiving the excrements. The sleeve is pressed down against the top cover of the pail by placing two weights on a flange thereon. The sleeve reaches down through the pail cover. In all cases a flange on the sleeve rests against the pail cover with an intermediate india rubber packing cord, and forms a gas tight joint therewith. This mode of connection permits of slight differences in the height of the pails, and admits of easily disconnecting from a full pail, and as easily connecting to a fresh pail. The lid of the hopper is so arranged that ventilation is not interrupted.

FIG. 2

3342. (1880.) ABSORBENT AND DEODORISING POWDER: T. B. GIBBS, LONDON. [2d.]—Consists of a powder for absorbing urine and the moisture contained in excrement, and deodorising the urine and excrement and fixing the ammonia therein, and for deodorising and absorbing the moisture in putrescible and moist matters, being applicable for use in 'dry closets'. The powder consists of a mixture of sulphate of lime, and soot or charcoal, and in some cases carbolic powder. The proportions are as follows:—sulphate of lime, 300 parts by weight; soot, or pulverised charcoal, 99 parts by weight; carbolic powder, 1 part by weight.

3251. (1880.) BRONCHITIS KETTLE: W. H. LLOYD, HARBORNE, STAFFORDSHIRE. [6d.]—Consists of the common kettle stand and spirit lamp, but a sinking is formed upon the bottom of the stand to receive and keep the lamp in its place. The kettle body is formed with a

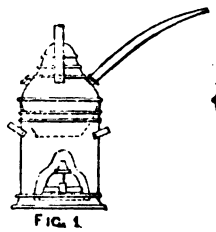


FIG. 1.

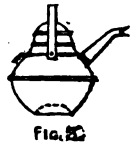


FIG. 3.

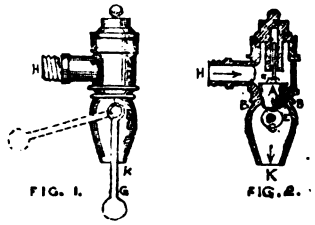
FIG. 2.

FIG. 4.

concave bottom and curved sides, so as to allow the flame to lick the sides of the kettle. The only openings into the kettle are one for filling, and another to receive the spout, placed at the side of the upper part of the body. The spout used to form the bronchitis kettle screws into the last opening; it is made of a form tapering as it rises, and slightly curved over towards the outlet end, which outlet is flattened so as to distribute the escaping steam. When it is required to use the kettle for ordinary purposes, this spout can be unscrewed, and a short one attached. When it is required to inhale the steam direct, a flexible tube, with a mouth-piece at the one end, is screwed into either of the two openings on the top of the kettle. It can also be used for warming food, or it can be used for a lamp bath or vapour bath by removing the basin.

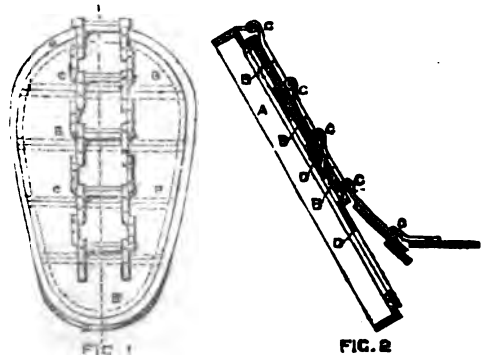
3356. (1880.) VALVES: E. SMITH, LONDON. [6d.]—Consists of improvements in bib, ball, float, and other valves, by the employment of means to overcome the jar in cocks, and danger of bursting pipes. In a ball cock, for instance, the valve is fitted in the ordinary way and rests on

the seat, the pressure of the water retaining it in position. Under the valve, and fitted in the waterway, is a cam mounted on a spindle free to move. To this spindle the arm carrying the ball is attached. When the ball falls, the



lever to which it is attached works the cam, which opens the valve gradually, and in rising gradually closes it, and thus, by the cam action, the concussion and jar due to any sudden action of the valve is obviated. A is the valve resting on the seat B; C is the cam, and is shown mounted on the spindle E, to which is fitted the arm or lever G; H is the inlet. The valve A is on the upper part, in some cases provided with a rod *a*, which works up and down in the guides I, so as to ensure the valve rising and falling perpendicularly. When applied as a ball cock, the lever G of the required length is provided with a ball, and as the same rises or falls by the difference in level of the water contained in the cistern, the valve is opened or closed by the action of the cam surface.

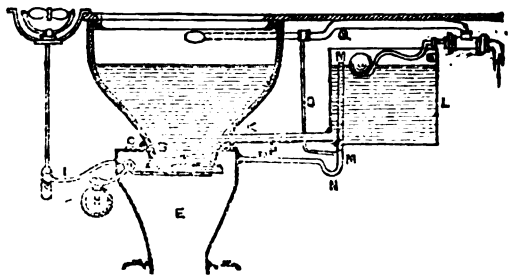
3497. (1880.) FOLDING GAS OR TIDE FLAPS: E. WILLARD & W. MORLEY. [4d.]—This invention relates to flaps or valves constructed to prevent the passage of gases from main sewers into lateral sewers, but allowing a constant flow of water from the lateral sewer into the main sewer, and closing by a sudden rise in the main sewer. The



flap is made in parallel sections, joined together in such a manner that the lowest section or flap can turn on the adjoining flap, the latter on the third, and so on, the uppermost section being attached to the valve seat by hinges. The joints of the flaps are made horizontal, and the flaps are connected by open hinges placed at the back of the latter, allowing the lower flap or series of flaps being lifted out, one or more flaps being also provided with a ring or hook for lifting it by hand. When the valve is closed the flaps rest on the face of the valve seat. The flaps may be made of iron, zinc, brass, or other material, and every flap except the lowest one is provided with a ledge made flush with the face of the valve seat, and projecting under the adjoining flap so as to form part of the seat of the latter. If the downward flow in the sewer is small the lowest flap only will be turned up, if the quantity of liquid becomes greater the two lowest flaps will open, and so on; but as the flaps can only open towards one side, a sudden back current will close the flaps on their seat. The valve seat or frame may be made of any shape and size required to fit existing sewers, or designed for new sewers. A is the seat; B, B, are the sections of the valve or flap, C, C, C, the hinges, the two lowest sections being open while the upper sections remain closed. Each section, except the lowest one, is provided with a ledge or plate D, which forms a seat for the upper edge of the adjoining (lower) section.

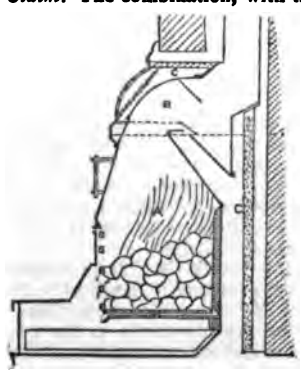
AMERICAN PATENTS.

234,934. WATER-CLOSET: ALEXANDER G. ALEXANDER, DETROIT, MICH. Filed July 29th, 1880. (No Model.) Issued Nov. 30th.—*Claim* 1. The combination,



with the water-closet bowl and a trunk, E, of the tank L, connected with the bowl by a pipe, K, the main-service pipe leading into the bowl, an overflow pipe, M, having a trap, N, and leading from the tank L into the trunk E, substantially as shown and described. 2. The combination, with the water-closet bowl and a trunk, E, of the tank L, connected with the bowl by a pipe, K, the main-service pipe leading into the bowl, an overflow pipe, M, formed with a trap, N, and leading from the tank into the trunk E, and a small pipe connecting the main-service pipe with the overflow pipe at a point above the trap in the latter pipe, as herein shown and specified. 3. The combination with the rigid soil-pipe and an independent support therefor, of the rigid branch pipe upon which the water-closet fitting is supported and secured, substantially as and for the purpose specified. 4. The combination of the rigid soil-pipe with the flexible branch pipe, the same consisting of two sections *l* and *l*¹, united together by means of the elbow M, for the purpose of providing against injury of the apparatus by settling of the part of the building upon which the outer or free end of said branch pipe rests, substantially as specified. 5. The combination of the cast water-closet fitting, provided with a flange for the reception of the water-closet, with a rigid branch pipe, substantially as specified. 6. The cast running trap or water-seal B, provided with hand-holes *b*, one at each of its extremities or horns, so as to provide easy access both to the trap and drain, substantially as specified. 7. The combination of the cast water-closet fitting, provided with a flange for the reception of the water-closet, with a flexible branch pipe, substantially as specified.

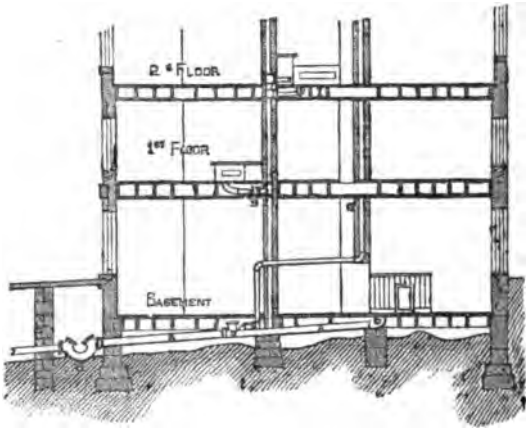
234,921. FIRE-PLACE HEATER: ALONZO R. MORGAN, NEW YORK, & GARDNER L. MORRISON, BROOKLYN, assignors to the Open Stove Ventilating Company, New York, N.Y. Filed Aug. 18th, 1880. (No Model.) Issued Nov. 30th. *Claim*. The combination, with the fire-box A



of an open-front stove or heater and a jacket, C, thereto, of the reverberatory chamber B, being connected at, and coinciding in form with, the top and contracted portion of the

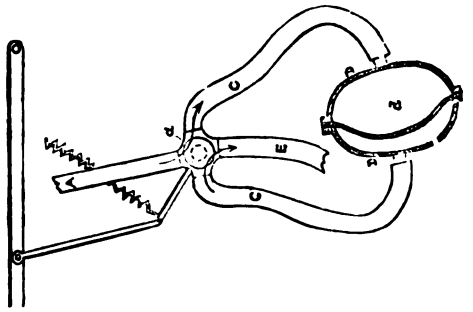
open firebox, expanding laterally, rearwardly, and vertically therefrom, one portion or plate of the shell extending from the point of its connection with the back of the fire-box down along and parallel with the forward slope of said back, and another portion or plate arching from the point of its connection with the front of the fire-box rearward beyond the aforesaid part, connecting with the back of the firebox, and then extending downwardly parallel with, and in near proximity to, the back of the jacket, to the point, or thereabout, of connection with said other part.

235,754. HOUSE DRAINAGE APPARATUS: CALEB W. DURHAM, CHICAGO, ILL. Filed April 3, 1880. Issued Dec. 21, 1880. *Brief.* The soil and drain pipes rest upon supports independent of the building, whereby any settling of the walls will not affect the joints of the pipe system.—



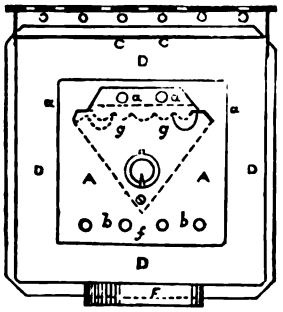
Claim 1. The drainage apparatus for buildings, consisting of a main drain connected with a rigid soil-pipe, supports therefor independent of the building, and rigid and flexible branch pipes, substantially as specified. 2. The combination, with the drain, of the vertical soil-pipe and a support therefor, independent of the building, substantially as specified.

235,573. WATER-CLOSET VALVE: WILLIAM M. SACK, OAKLAND, CAL. Filed April 17, 1880. (No model.) Issued Dec. 14, 1880.—*Claim* 1. The improve-



ment in water-closet valves consisting in the combination, with the supply-pipe, A, and discharge-pipe, E, with its four-way valve, *a*, and lever, B, of the chamber feeding and discharging pipes C C^1, water chamber D, and flexible diaphragm *d*, whereby a double washing of the bowl is secured and an equal quantity of water used at each operation, substantially as herein described.

235,640. GAS STOVE OR OVEN: ALBANUS W. MORTON, BROOKLYN, assignor to Morton Gas Stove Company, New York, N. Y. Filed March 19, 1880. (No Model). Issued Dec. 21, 1880.—*Claim* 1. In a gas cooking or heating oven, a heat-radiating bottom, *f*, and a series of gas-jets placed in the top of said oven, the whole combined and arranged to permit the article to be baked to be placed between, and simultaneously subjected to the action of the heat-radiating bottom *f* and of the naked flames of the gas-jets or the heat directly radiated from said flames, all substantially as and for the purpose herein set forth. 2. The oven A, having a series of gas-jets *g*, in its upper



part, and at its lower part the heat-radiating bottom *f*, and in its sides the opening *a*, in combination with the jacket C, having between it and the oven A the space D, and provided at bottom with the opening F, and at top with the opening *c*, all substantially as and for the purpose herein set forth. 3. The flanges b^1, in combination with the series of gas-jets *g*, placed in the upper part of the oven A, the said oven being constructed with the openings a^1 in its sides, substantially as and for the purpose herein set forth.

NOTICES OF MEETINGS.

NATIONAL HEALTH SOCIETY.

The usual spring course of lectures, known as the Mayfair Lectures, will commence, under the auspices of the National Health Society, on April 22nd, at 23, Hertford Street, Mayfair, at 4 P.M., by a lecture on 'House Sanitation,' by Professor Fleeming Jenkin, of Edinburgh. The following lectures will be delivered—'Stoves and Grates,' by Dr. Siemens, F.R.S.; 'Health of our Public Schools,' by Dr. Robert Farquharson, M.P.; 'Sanitary Relations of Local Self-government,' by C. N. Cresswell, Esq.; 'Care and Education of the Eye,' by Henry Power, Esq., M.B., F.R.C.S.

LONDON INTERNATIONAL MEDICAL AND SANITARY EXHIBITION.

The list of Judges by whom certificates of merit will be awarded in the SANITARY SECTION are: For Domestic and Hospital Architecture, Planning, Construction, Decorative Materials—Sir Joseph Fayrer, K.C.S.I., M.D., F.R.S., George Aitchison, F.R.I.B.A., Fred. J. Mouat, M.D., F.R.C.S., P. Gordon Smith, F.R.I.B.A., Thomas Roger Smith, F.R.I.B.A., Henry Saxon Snell, F.R.I.B.A., Alfred Waterhouse, A.R.A. For Ventilation, Lighting, and Warming—H. H. Collins, F.R.I.B.A., Captain Douglas Galton, C.B., F.R.S., George Godwin, F.R.S., F.S.A., Ernest Hart, M.R.C.S., Edward C. Robins, F.S.A., F.R.I.B.A. For Water-Closets, Sinks, Baths, etc.; Sewerage and Drainage—Professor W. H. Corfield, M.D., William Eassie, C.E., Rogers Field, M.Inst. C.E., R. Thorne Thorne, M.B., Ernest Turner, F.R.I.B.A. For Water Supply and Filtration—Lieut.-Colonel Frank Bolton, Prof. Francois de Chaumont, M.D., F.R.S., R. B. Grantham, M.Inst.C.E., Prof. Prestwich, F.R.S.

In the MISCELLANEOUS SECTION: Applications of Hygienic principles to Food and Dietaries, Clothing, etc., School Furniture, and other Articles more or less connected with the general purpose of the Exhibition—the Judges are Mrs. Garrett Anderson, M.D., J. C. Buckmaster, Alfred Carpenter, M.B., Dr. J. H. Gladstone, F.R.S., W. A. Meredith, M.B.

ORIGINAL PAPERS.

SANITARY NOTES.

By J. Lane Notter, B.A.,
Surgeon-Major, Army Medical Department; Assistant-Professor of Military Hygiene in the Army Medical School, Netley.

On the Filtration of Potable Water.

IV.

(*Continued from page* 164, *vol.* 2, *New Series.*)

Filtration through Charcoal.—There are several varieties of carbon, obtained by artificial processes, in the market; the most important of these are the *lampblack*, *wood charcoal*, and *animal charcoal*. For the purposes of filtration, the last is the most effective, and should be the only form used in filters. Animal charcoal is obtained by heating bones in vessels from which the air is expelled. The proportion of animal to mineral substance in bones is about one-third of the former to two-thirds of the latter; fully one-half of the mineral substance is made up of phosphate of lime and a little carbonate of lime. When the bones are heated in a retort or vessel, so that the air is not allowed to have free access to them, the animal matter undergoes 'destructive distillation'. By this term is meant the resolution of a complex substance into simpler forms, by the aid of heat without air. Bone is thus broken up into its component elements, carbon, hydrogen, nitrogen, and oxygen, these last three passing nearly entirely away in the gaseous products, together with a small portion of the carbon, while a very considerable portion of the carbon remains behind, intimately mixed up with the earthy ingredients of the bone, and constituting the substance known as animal charcoal. It is a fact worth noticing, that the vapours evolved from bone charcoal are always *alkaline*, while those from wood charcoal are *acid*. This is due to the presence of nitrogen in bone, wood being nearly free from that element. Bone charcoal contains nearly nine-tenths of its weight of phosphate of lime with a little carbonate of lime.

Charcoal has the peculiar property of absorbing into its pores very considerable quantities of gases, and especially those which are easily taken up by water. One cubic inch of charcoal is said to be capable of absorbing nearly 100 cubic inches of ammonia gas and fifty cubic inches of sulphuretted hydrogen. This condensation of gases is stated to be mechanical, and not to involve a chemical combination of the charcoal with the gas. Eventually, all offensive gases are acted on by the oxygen which the charcoal has stored up within its pores. A cubic inch of charcoal absorbs nearly ten cubic inches of oxygen, and perhaps condenses it, and this oxidises and converts into innocuous compounds any deleterious matter submitted to its action. One curious fact is, that charcoal which resists most chemical agents at the ordinary temperature, is oxidised by nitric acid. This is capable of demonstration, for if we pour a little nitric acid on finely powdered charcoal, the latter takes fire at once.

Charcoal, both animal and vegetable, is perhaps the material most commonly used for filters, and although animal charcoal is by far the most effective, still, from reasons of economy and cheapness, a large quantity of wood charcoal is sold for the same purpose. Roughly, a good plan to test the charcoal is to heat it, when the peculiar odour given off from heated bone is characteristic. This as I mentioned before, is due to the presence of nitrogen in bone charcoal. Filtering through charcoal is generally supposed to rid the water of the dissolved organic impurity, as well as of the suspended matters. This is not the case; it merely changes the form of the organic matter, and generally to such a one as to render it innocuous or nearly so. Charcoal has the remarkable power of condensing gases in its pores, it greedily absorbs oxygen from the atmosphere, and this is ready to oxidise any oxidisable matters with which it may come in contact. It must however, be remembered, that the compound of which the organic matter is made up, passes into the filtered water—that it is not eliminated, but only changed in form.

Animal charcoal in loose fragments or granules.—This form has a good purifying effect, and its action is very rapid; attention to one or two points is however essential. There must be a sufficient depth of charcoal, and the pressure must not be too great; neither must the material be left too loose in the filter, but it must be moderately compressed. Unlike spongy iron, the filter when not in use is best left dry, and it should never be allowed to remain for any lengthened period without being thoroughly drained, so as to expose it to fresh currents of air. The filter we experimented on, is made of galvanised iron (a material not recommended) lined with Crease's patent cement, it is cylindrical in form, fifteen-and-a-half inches in height, and eight inches wide, and is filled, to a depth of ten-and-three-quarter inches, with granular animal charcoal, which is compressed by means of a screw and perforated metal plate. There is no reservoir, so that it holds only as much water as can remain in the interstices of the charcoal. This form of filter is intended for rapid filtration, and may be connected by means of a tube to any source of water-supply. It can very easily be opened, and the charcoal exposed to heat or light and air, or if practicable, renewed.

Rate of delivering from this filter.—The filter having no reservoir, is only influenced by the pressure of the water, and that remaining the same, the rate is very regular. Thus, when the tap was full on, (the filter being full), the mean delivery was in the first experiments 25 cc. in 2.2 seconds, or one gallon in 6.6 minutes, equal to 218 gallons in twenty-four hours. The tap half on yielded 25 cc. in 3.875 seconds, or one gallon in 11.6 minutes, equal to 124 gallons in twenty-four hours. The tap one-quarter on yielded 25 cc. in six seconds, or one gallon in eighteen minutes, equal to eighty gallons in twenty-four hours. The tap one-eighth on yielded 25 cc. in fourteen seconds, or one gallon in forty-two minutes, equal to fifty-seven gallons in twenty-four hours.

When the filter was filled and allowed to run out, the yield progressively decreased as the pressure diminished. Thus in one experiment the following results were obtained:—

First pint was yielded in	15	seconds,	equal to	715	gallons in	24	hours.
Second	"	"	14	"	"	771	"	"
Third	"	"	17½	"	"	612	"	"
Fourth	"	"	20	"	"	540	"	"
Fifth	"	"	27	"	"	400	"	"
Sixth	"	"	39	"	"	275	"	"
Mean	"	"	22.83	"	"	470	"	"

In another experiment, when the filter was allowed to run dry, the following results were obtained:—

First quart was delivered in	25	seconds,	equal to	854	gallons in	24	hours.
Second	"	"	32	"	"	670	"	"
Third	"	"	50	"	"	427	"	"
Fourth	"	"	65	"	"	330	"	"
Remainder (about a pint)			40	"	"	268	"	"

Thus this filter was emptied in 212 seconds, or at the rate of 456 gallons in twenty-four hours, a result nearly corresponding with the previous experiments. If the supply of water into the filter were continuous, it is obvious that the water would be delivered at the rate of the first quart above shown, and that it would yield up to 800 gallons in twenty-four hours, according to the presence of the water supplied. This filter tends to clog very little, and may be advantageously used as a very rapid filtering medium. When the water is allowed to run straight through the filter, it is exposed to the influence of the filtering medium only one-and-three-quarter minutes, but this exposure may be increased if so large a supply of water is not required.

Purifying effect of this filter.—In order to determine this, a sample of water was selected that contained a considerable amount of dissolved impurity without much suspended matter. It was taken from a disused well in the neighbourhood. The following is the result of its analyses in its original condition.

Analyses of a sample of water as drawn from the well: Physical characters.—Clear and colourless; little suspended matter. *Qualitative analysis* showed all the usual constituents in large quantity, except oxidisable matter as shown by chloride of gold.

Hardness.—Total	23°.8	Degrees of Clark's Scale.
Fixed	15°.0	
Temporary and Removable	8°.8	

Quantitative Analysis.

	Grains per gallon.	Parts per 1,000,000
Volatile matter by incineration and after recarbonating ..	19.5600	
Including Oxygen required for oxidisable organic matter		0.6400
Including Ammonia free		11.2980
Including ,, albuminoid		1.1090
Including Nitrous acid		1.3000
Including Nitric acid		210.0000
Chlorine	8.3000	
Sulphuric acid (SO_4)	21.8400	
Calcium (chiefly as carbonate)	3.5000	
Carbonic acid (fixed) [CO_2]	4.2000	
Magnesium	3.1920	
Sodium, potassium, silica, etc., etc.	6.8480	
Total solids by evaporation	67.4400	

This was a particularly bad water and would therefore form a severe test for the filter. Portions of it were passed through the filter at the quickest rate they would yield, so that the water was in contact with the filtering medium about two minutes. The following table gives the results, the first column giving the analyses of the original water, and the others, respectively, the analyses after filtration, with differences both actual and per cent.

Table of Results showing the effects of Filtration.

Constituents.	Original Water.	Charcoal Filter. Quantities.	Difference. Actual.	Per cent.
Chlorine, grains per gallon	8.3000	8.4000	+ 0.100	+ 1.21
Calcium (fixed) ,,	0.700	1.960	+ 1.260	+ 179.00
Magnesium ,,	3.192	2.016	— 1.176	— 36.70
Sulphuric acid ,,	21.840	10.416	— 11.424	— 52.00
Calcium carbonate ,,	7.000	nil.	— 7.000	— 100.00
Hardness, total ,,	23°.800	17°.150	— 6°.650	— 27°.80
,, fixed ,,	15°.000	13°.300	— 1°.700	— 11°.50
,, removable ,,	8°.800	3°.850	— 4°.950	— 56°.26
Organic Oxygen, parts per 1,000,000	0.640	0.250	— 0.390	— 60.50
Nitrous acid ,,	1.300	7.200	+ 5.900	+ 455.00
Nitric Acid ,,	210.000	78.000	— 132.000	— 63.00
Free ammonia ,,	11.298	6.773	— 4.525	— 40.25
Albuminoid do. ,,	1.109	0.639	— 0.470	— 42.50
Solids, total, grs. per gallon	67.440	54.040	— 13.400	— 19.75
,, fixed ,,	47.880	36.820	— 11.060	— 24.20
,, volatile ,,	19.560	17.220	— 2.340	— 12.00

From these results we may gather that the power of this particular charcoal of dealing with organic matter is as follows:—

Diminution per Cent.	
Oxygen for organic matter	60.50
Albuminoid ammonia	42.50
Sums	103.00
Means..	51.50
Free ammonia	40.25

Filtration through a Silicated Carbon Filter.—This is an earthenware filter of the ordinary construction, the medium being a cake of carbon three inches thick. The surface of the carbon can be easily got at from above. There is a reservoir below, capable of holding about one gallon.

Rate of delivery from this filter.—When the reservoir is full, 25 cc. are delivered in one second, and this is equal to 480 gallons in twenty-four hours; but when empty, 25 cc. take about six seconds, which is equal to eighty gallons in twenty-four hours, and it will even run to 100 gallons. If, however, the water is turbid, the charcoal block soon begins to clog and the yield runs down to fifty, forty, or even to nine and six gallons in the twenty-four hours. The flow may however be somewhat restored by scraping the block with a piece of glass. The water is exposed to the filtering medium about fifteen or sixteen minutes as an average.

Purifying power of this filter.—This filter was put to precisely the same test as the previous one experimented on, and the same sample of water was passed through it. The following table gives the results of the analyses both before and after filtration.

Table of Results showing the effects of Filtration.

Constituents.	Original Water.	Silicated Carbon Filter. Quantities.	Difference. Actual.	Per cent.
Chlorine, grains per gallon	8.390	8.900	+ 0.600	+ 7.22
Calcium (fixed) ,,	0.700	1.820	+ 1.120	+ 159.00
Magnesium ,,	3.192	3.192	nil.	— 100.00
Sulphuric acid ,,	21.840	18.144	— 3.696	— 15.00
Calcium carbonate ,,	7.000	0.700	— 6.300	— 90.00
Hardness, total ,,	23°.800	21°.700	— 2°.100	— 8.80
,, fixed ,,	15°.000	17°.850	+ 2°.850	+ 18.90
,, removable ,,	8°.800	3°.850	— 4°.950	— 56.20
Organic oxygen, parts per 1,000,000	0.640	0.380	— 0.260	— 40.50
Nitrous acid ,,	1.300	0.764	— 0.536	— 41.50
Nitric acid ,,	210.000	66.000	— 144.000	— 68.50
Free ammonia ,,	11.298	7.418	— 3.880	— 34.50
Albuminoid do. ,,	1.109	0.762	— 0.347	— 31.40
Solids, total, grs. per gallon	67.440	44.415	— 23.025	— 34.30
,, fixed ,,	47.880	36.885	— 11.025	— 23.00
,, volatile ,,	19.560	7.560	— 12.000	— 61.00

From these results we may gather that the granular animal charcoal is superior to the silicated carbon, particularly in its power of dealing with the organic matter. Thus in this filter we have:—

Diminution per Cent.	
Oxygen for organic matter	40.50
Albuminoid ammonia	31.40
Sums	71.90
Means..	35.95
Free ammonia	34.50

A further series of experiments were now undertaken. The filters used were an earthenware filter filled with the best granular animal charcoal, which was moderately compressed by means of a perforated

earthenware plate, the depth of charcoal being twelve inches, and a new silicated carbon filter, said to possess all the latest improvements. Each filter was thoroughly washed out before commencing the experiments, and the solutions used were made either of pure distilled water, or the tap water supplied to the laboratory. This latter is a surface water containing nearly seven grains of total solid matter in the gallon, a very small quantity of chlorine, 0.1000 of a milligramme of albuminoid ammonia per litre, and no free ammonia.

Constituents.	Animal Charcoal.	Silicated Carbon.	Original Water.	Remarks, etc.
First Series.				
Total oxygen ..	0.6600	0.5800	1.5400	Tap water, with a little portion of stable sewage added.
Organic do. ..	0.5400	0.3800	1.3000	
Nitrous acid ..	0.3450	0.5750	0.6900	
Free ammonia	0.5568	0.4400	0.7468	
Albuminoid do.	0.1900	0.1328	0.2840	
Second Series.				
Total oxygen ..	0.2600	0.1800	1.5400	Distilled water, one grain of sulphate of quinine to each gallon.
Organic do. ..	0.1000	0.1400	1.2200	
Nitrous acid ..	0.4600	0.1150	0.9200	
Free ammonia	0.0804	0.0504	0.0504	
Albuminoid do.	0.0976	0.1340	0.6240	
Third Series.				
Total oxygen ..	2.3000	1.0200	3.7800	Tap water, to which was added some sour soup from which the fat was not removed.
Organic do. ..	1.7400	0.7000	2.6600	
Nitrous acid ..	1.6100	0.9200	3.2200	
Free ammonia	2.3600	0.9600	4.4160	
Albuminoid do.	4.3209	1.8200	6.0400	
Fourth Series.				
Total oxygen ..	2.9000	0.3800	1.7000	3 cc. fresh albumen added to 10 gallons of distilled water. N.B.—The distilled water was not quite pure.
Organic do. ..	0.4200	0.1800	0.5000	
Nitrous acid ..	1.3800	0.5750	2.3000	
Free ammonia	nil.	nil.	nil.	
Albuminoid do.	0.5056	0.1536	0.7680	

DIMINUTION PER CENT.

Constituents.	Animal Charcoal.	Silicated Carbon.
First Series.		
Total oxygen	— 57	— 62
Organic oxygen	— 59	— 71
Nitrous acid	— 65	— 41
Free ammonia	— 39	— 40
Albuminoid ammonia	— 33	— 53
Second Series.		
Total oxygen	— 83	— 88
Organic oxygen	— 92	— 87
Nitrous acid	+ 40	— 88
Free ammonia	+ 60	nil.
Albuminoid ammonia	— 84	— 78
Third Series.		
Total oxygen	— 39	— 73
Organic oxygen	— 34	— 73
Nitrous acid	— 50	— 72
Free ammonia	— 46	— 78
Albuminoid ammonia	— 28	— 70
Fourth Series.		
Total oxygen	— 31	— 71
Organic oxygen	— 16	— 64
Nitrous acic	— 40	— 75
Free ammonia	nil.	nil.
Albuminoid ammonia	— 55	— 80

A further series of experiments were undertaken to test the value of the silicated carbon block as usually sold in glass filters. One of these filters was purchased, and carefully cleansed by passing nearly a gallon of pure distilled water through it.

First Experiment.—0.4 cc. of albumen from a new laid egg was added to one gallon of pure distilled water, and passed through the filter. The first quart was rejected, and the third drawn examined. The following results were obtained:—

Constituents.	Original Water.	Filtered Water.	Diminution per cent.
Total oxygen..	0.9800	1.0600	+ 8
Organic oxygen	0.7400	0.7400	nil.
Nitrous acid	0.6900	0.9200	+ 34
Free ammonia	nil.	nil.	nil.
Albuminoid ammonia ..	0 6608	0.5376	— 19

Second Experiment.—The above experiment is repeated, the only difference being that 150 cc. are distilled over for the free ammonia in both samples. The original and filtered water are treated in exactly the same manner, and the experiment is completed at the same time:—

Constituents.	Original Water.	Filtered Water.	Diminution per cent.
Total oxygen..	1.7400	1.3400	— 23
Organic oxygen	1.0600	1.0200	— 4
Nitrous acid	1.9500	0.9200	— 53
Free ammonia	nil.	nil.	nil.
Albuminoid ammonia ..	0.7360	0.7296	— 1

Third Experiment.—One gallon of pure distilled water was passed through the filter, filter drained, surface wiped, and distilled water again passed through, 0.5 cc. of fresh albumen to one gallon of pure distilled water used, the first quart rejected as before, the second quart examined with the following results:—

Constituents.	Original Water.	Filtered Water.	Diminution per cent.
Total oxygen..	1.5400	1.3000	— 16
Organic oxygen	1.0600	1.0600	nil.
Nitrous acid	1.3800	0.6900	— 50
Free ammonia	nil.	nil.	nil.
Albuminoid ammonia ..	0.8636	0.8321	— 3

Fourth Experiment.—The filter used in the previous experiment was thoroughly drained, and one gallon and a half of pure distilled water was passed through it, it was then dried, and exposed to strong sunlight for three days. To one gallon of pure distilled water .08 of a gramme of sulphate of quinine was added, the first pint passed through was rejected, and that which ran through subsequently was examined as before:—

Constituents.	Original Water.	Filtered Water.	Diminution per cent.
Total oxygen..	1.7600	1.7600	nil.
Organic oxygen	1.1460	1.2200	+ 8
Nitrous acid	1.7800	1.5500	— 14
Free ammonia	nil.	nil.	nil.
Albuminoid ammonia ..	0.6780	0.4096	— 27

It is hardly necessary to add that this filter is practically useless, the accumulated organic matter would speedily begin to decay, and render the water passing through it of poorer quality, doing more harm than good.

The results obtained so far lead to the conclusions that charcoal in fragments is better than compressed blocks. On the whole our experiments tend to show that water is greatly improved by ordinary brief exposure to animal charcoal filters, but if left long in contact with the charcoal it again takes up impurity to a large extent. This shows clearly that the action of the charcoal is only partial, that it leaves untouched some forms of organic matter, or at all events that a good deal of impurity is retained in the filtered water, which easily assumes a putrefactive state. In this statement I am fully borne out by the Commissioners

appointed to inquire into the best means of preventing the pollution of rivers. In their sixth report, page 220, they state: 'Indeed, we found that myriads of minute worms were developed in the animal charcoal and passed out with the water, when these filters were used for Thames water, and when the charcoal was not removed at sufficiently short intervals. The property which animal charcoal possesses in a high degree of favouring the growth of the lower forms of organic life is a great drawback to its use as a filtering medium for potable waters.'

I undertook a further series of experiments, in order to test the keeping power of water passed through these charcoal filters. Samples of pure distilled water and ordinary tap water were passed through, after the filters had been most carefully washed with plenty of distilled water, and well drained. One sample was placed in a stoppered bottle, and one in a bottle unstoppered, and these were fully exposed to light for ten days. The original tap water contained extremely little sediment, and showed none on keeping.

1. *Granular charcoal filter.*—Both samples in both bottles showed a yellowish deposit, which, under the microscope, appeared granular, with a very large number of moving bodies, the sphærobacteria of Cohn.

2. *Silicated carbon filter.*—Much less deposit, and hardly any in the filtered sample; in the other were a few micrococci and one or two infusoria.

From the foregoing experiments I think we may deduce the following facts: 1. That water may be very considerably purified by charcoal; that the purification is very rapid, and it is for the most part satisfactory, if the charcoal is *fresh*, and if the water is to be used immediately. 2. That vegetable charcoal has but little power of purifying water. 3. That the water must not be left long in contact with the animal charcoal. 4. That water filtered through animal charcoal must not be stored for any length of time, as there is danger of the formation of low organisms. 5. Charcoal in the form of compressed blocks tends to clog, and these are not adapted for much work.

(To be continued.)

THE ETIOLOGY OF DIPHTHERIA.

By ARTHUR DOWNES, M.D., S. Sc. Cert. Camb., M.O.H.

The village of A——, to which the following remarks relate, is situated in an agricultural district in the Eastern Counties, and consists of one hundred and eighty houses, with a population of nearly nine hundred. A dozen or fifteen of the houses are occupied by the wealthier residents, a score or more are held by tradesmen and others, and the residue are of the cottage class. The cottagers are fairly well-to-do.

A small water-course runs northward in a shallow depression, the ground rising moderately on the eastern and western sides. Along this depression, and on the western and southern slopes of the eastern hill, stands the chief portion of the village. The smaller portion crosses the depression at the northern end and rests partly on the western, partly on the eastern rising ground.

The subsoil in the higher parts of the village is drift gravel and sand overlying the London clay. Along the central valley the soil appears to be alluvial, especially towards the northern end, where stiffish clay is met with. In the upper portions of the village the wells have to be sunk twenty to thirty feet, but at the base of the eastern hill along the line of junction with the central depression, spring-water is obtained from wells only four feet in depth.

The mean elevation of the village above Ordnance datum is about one hundred feet, varying from about eighty in the lower part to one hundred and twenty in the upper portions. The mean annual rainfall on an average of nine years (1872 to 1880) is 27.9 inches. The houses along the line of the water-course are occasionally flooded, and the whole village is somewhat frequently immersed in fog. Its conformation saves it from bleakness. The drainage hitherto has been very defective, the water-course being used as a common sewer, and receiving, not only such drains as exist, but also contributions from sundry privies built over it. The larger houses have water-closets, but the prevailing mode of excrement disposal is the old-fashioned privy provided (except in the case of those over the water-course) with unventilated cesspit. In very many cases these latrines are within a few paces of the house. Liquid matters are disposed of by imperfect drains or simply by throwing them on to a heap of refuse in the back-yard. [I may remark, *par parenthèse*, that all these sanitary defects, in respect of which the village in question was by no means peculiar, are now in course of thorough abatement, a complete system of sewerage and water-supply—at constant pressure—having been carried out by the Sanitary Authority, although not finished at the time of the outbreak hereafter described.]

The water-supply, hitherto, has been derived from four public pumps and a few private wells. Two of the private wells are artesian, but the remainder draw from the porous substrata of the village. The following chief results of my analyses will illustrate their character:—

Name of Well and Depth.	Parts per 100,000.					
	Chlorine.	Nitrogen, as Nitrates, etc.*	Oxygen required for Oxidation.†	Ammonia.		Nitrites.
				Saline.	Organic.	
Public A, 4 ft.	5.8	4 00	.064	.001	.010	nil.
,, B, 20-30 ft.	7.7	5.60	.160	.000	.014	trace.
,, C, 4 ft.	5.2	5.40	.104	.000	.014	nil.
,, D, 20-30 ft.	4.5	5.00	.084	.000	.012	nil.
Private No. 1, ? ..	9.9	7.50	.100	.000	.018	trace
,, ,, 2, 20-30 ft. ..	11.0	7.00	.244	.001	.032	nil.

* Slightly too high, but deviation unimportant.
† Standard solution of potassic permanganate acting for three hours in the cold in presence of dilute H_2SO_4.

The great excess of nitrates is significant; hardness from 25 to 40 degrees.

Zymotic History.—This has an especial importance in connection with diphtheria—the most localised of our current contagious zymotics—and I regret, therefore, that, in the absence of available data, my remarks on this point must be meagre.*

The chief fact to be noted is that A—— stands in the heart of what I may term a diphtheria-field.

It may be urged, and I quite agree with the objection, that mere death-rates may be no guide to

* In the Utopia of sanitary organisation, might not the custody of the statistical records, now lodged with Superintendent Registrars, and the functions connected therewith, vest in the Health Officer? At present he has no access to these, save by personal favour and at much inconvenience. I do not set an over-great value on statistics drawn from our present registration-books; but, if taken for a sufficient period to minimise error, their worth is incontestable. As matters stand, the compilation of a statistical sanitary report is somewhat akin to brick-making under the second Pharaoh.

geographical prevalence of a disease, but in the present instance local tradition indicates that A—— has been specially subject to outbreaks of diphtheria, both epidemic and sporadic. The following table, relating to the parish of which this village forms the chief portion, was compiled by my able predecessor in office:—

Mean annual death-rate (1861-70) *per* 100,000 *living.*

	A— Parish.	B— Union.	Eastern Counties.
Scarlet Fever	72	60	67
Diphtheria	72	51	30
'Fever'	82	66	67

Present Outbreak.—On November 9th, 1880, I reported to the Sanitary Authority that I had found in the village thirty-six cases of 'infectious sore throat' distributed in seventeen families; that the majority had been or were of a slight character, so that parents in some instances declined to believe that there could be anything of an infectious or specific nature connected with their children's 'quinsy,' but that several cases were severe, two deaths having already occurred. I further reported that the outbreak was a complex one, for the cases ranged themselves into two groups.

In the one group, consisting of eleven cases in six families and entirely limited to a compact collection of houses near the centre of the village, the symptoms were those of scarlet fever, and each child suffered from a sequence of rash, sore throat, and subsequent desquamation, but without subsequent kidney complication. None of these cases proved fatal. In the other group, twenty-five cases in eleven families, and not strictly localised to any one part of the village, there was sore throat with diphtheritic exudation in some instances, but unattended by rash and not followed by noticeable desquamation. In this group five deaths occurred (three on one day, November 12), each fatal case presenting all the characteristics of severe—but hardly 'malignant'—diphtheria. The curious relationship between scarlet fever and diphtheria, in more aspects than one, has suggested to some the idea that the germ of the one may be an offshoot or 'sport' from that of the other.* Bearing this in mind, I very carefully investigated the possibility of relation between the two groups of cases, and came to the conclusion that none could be traced, and that I had to deal with concurrent but entirely distinct outbreaks, the one of scarlatina the other of diphtheria.

There are two points to be considered in connection with the scarlatina attack, viz., the original source of the contagion and the causes leading to its subsequent spread. There are two possibilities as to the origin of the affection at the first house attacked. There had been a few sporadic cases of scarlatina in the vicinity earlier in the year, and the housewife informs me that 'having been in the "public" line', they have a great many visitors, and she thinks that the infection may thus have been introduced from some house in the neighbourhood. The other possibility is this: immediately before the children sickened, a boy from London had been staying at this house on a visit. So far as was known he was in his usual health, nor could I learn that any, illness had occurred at his home. It may be, however, that through this lad the infection was brought to A——. I do not think that school attendance had any share in its dissemination, for, had the schools formed a focus of diffusion, cases would in all probability have occurred in other parts of the village or parish. Although four-sixths of the families were customers of one milkman, there was nothing whatever in connection with the milk-supply to account for the remarkable localisation of these cases, or to cause one to suspect milk as a vehicle of contagion.

The Diphtheria Outbreak.

No.	Age.	Sex.	Date of Attack.	School.	Milk.	Water.
1.	7	F.	About Oct. 4	National	Carter	'D'
2.	—	M.	,, ,, 6	——	,,	,,
3.	11	F.	Subsequently	National	,,	,,
4.	9	M.	About Oct. 15	,,	nil	,,
5.	12	F.	Oct. 29	,,	,,	,,
6.	5	F.	,, 20	,,	Connell	'C'
7.	11	F.	,, 22	,,	Mr. W.	'A'
8.	2½	F.	,, 30	——	,,	,,
9.	6	F.	Nov. 1	National	,,	,,
10.	8	F.	Oct. 21	,,	Coles	'B'
11.	6	F.	,, 26	,,	,,	,,
12.	?	M.	Nov. 2	,,	,,	,,
13.	infant	?	,, 6	——	,,	,,
14.	5	F.	Oct. 24	National	Carter	'A'
15.	3	F.	Nov. 1	,,	,,	,,
16.	8	F.	Oct. 25	,,	Mrs. T.	'C'
17.	—	F.	Subsequently	——	,,	,,
18.	7	F.	Oct. 28	National	Connell	,,
19.	9?	F.	About Oct. 25	,,	Mr. F.	Spring
20.	10?	F.	,, ,,	,,	,,	,,
21.	8	F.	Oct. 28	,,	Carter	'D'
22.	9	F.	Nov. 5	,,	,,	,,
23.	4	F.	,,	,,	,,	,,
24.	11	M.	,,	,,	,,	,,
25.*	9	M.	,, 2	,,	,,	,,

NOTES.—No. 3 is stated to have had scarlet fever when a baby, to have had diphtheria two or three years ago, and to be very subject to sore throat—as are the others of this family.

Nos. 4 and 5 had scarlet fever three or four years ago.

No. 6 is said to have had a slight attack of diphtheria a year ago, and was attended by a medical man at that time.

Family of No. 16 lost a boy 'with something in the throat' about ten years ago.

Family of No. 18 lost a child from diphtheria 18 or 19 years ago.

Family of No. 21-24 lost two children (by a former wife) from diphtheria in 1859.

Origin of the Affection.—On November 9th I reported what I considered to be the starting point of this outbreak, but here I lost the thread of my inquiry. There was no evidence that the illness at the first house invaded was connected with any quality of milk or with any affection of the lower animals. I was assured that the children had not been in contact with any one suffering from sore throat, that they had been away nowhere, and that they had had no visitors. The value of this assurance will presently appear.

Shortly after the date of the report referred to, I discovered that a boy, a nephew of the householder, had come (on October 2nd) from a town about nine miles distant, on a visit to his uncle. This lad was then convalescent from diphtheria, and was sent to A—— on medical authority for change of air. He was said to have recovered from his attack a month before coming. The lad remained a month at his uncle's.†

Dissemination of the Infection.—The facts of the outbreak which stand out pre-eminently are, first, that (excluding an infant) 19-24ths of the persons attacked were females; secondly, that 21-24ths

* This suggestion, made by Dr. Ransome in the Epidemiological Society's *Transactions*, was, if I remember rightly, illustrated by reference to the relation between the so-called 'soluble' ferments and the living organisms from which they are derived. The analogy, however, can hardly be maintained if, as we believe, the contagium of diphtheria is self-multiplying.

* Two slight cases only can be added to the above list as having occurred down to the present date (January 24th, 1881), so that this singular explosion of diphtheria subsided as quickly as it arose.

† I have since learned from the medical attendant of this boy that he had on September 6th 'a slight film on one tonsil', and by the doctor's advice took two bottles of medicine, which lasted him four days: he was then convalescent. Shortly afterwards a sister sickened and died on September 20th of diphtheria'.

were children attending the National Schools, and that, of the eleven houses invaded, the first case in 9-11ths was a *girl* attending those Schools. This was the more remarkable, because in the two houses where a boy was first seized there were special opportunities for acquiring the infection independently of school attendance. The evidence, therefore, points to the girl's side of the National Schools as the special focus of diffusion. Now, I find from the school register that the first child attacked was absent ill from October 4th to October 10th inclusive.* On October 11th she returned, stayed away on the 12th, and finally returned daily until the Schools were closed on October 30. Her sister (No. 3) had, I believe, only slight sore throat at first (she had a more severe attack, or relapse, with swelling of cervical glands, in November) She was absent from school only on October 12th and 13th, 19th and 20th, and 26th and 27th.

I think that to the attendance of these children at school the diphtheria explosion occurring between October 20th and 28th was directly due. It may further be stated that all, or nearly all, of the children attacked were in the same *clique* at school, playing together to the exclusion of others at kiss-in-the-ring and other games well adapted for transference of diphtheria contagion. An inspection of the school arrangements and buildings showed the isolation of the boys, even of the infant school, from all the girls during playhours, and showed, also, the great facility afforded by the construction of the cloak lobbies for the dissemination of contagion—though not, perhaps, of diphtheria.

There are two points at which it is necessary to glance to complete this report.

The first is, had this outbreak any relation to ordinary filth nuisances? I think not. Its origin has, I believe, been clearly shown to have been external to the village; nor did its incidence, either in point of localisation or of severity, coincide with any special sanitary defects—that is as compared with the rest of the village. The houses attacked, all of cottage class, were, indeed, on the whole, better off than the average of A——. All had, it is true, the old type of privy in yard or garden, but none were in direct connection with drains or in special proximity to any stinking refuse or ditch. A number of houses in the village were on Oct. 10th flooded by an overflow of the water-course, which made a clean sweep of the line of privies and carried an offensive deposit into the dwellings in question. Not one, however, was invaded by illness. The next point is an interesting one, viz., the possible influence of rainfall.

At 9 A.M. on Oct. 28th the rainfall at A—— for that month was 7.17 inches. Of this phenomenal quantity 2.55 inches fell in one day—October 9th. Most observers regard damp, whether of house or surroundings, as favourable to the development of diphtheria, and my experience certainly agrees with this. Dr. Airy has, in a recent valuable report, compiled the following table, showing the monthly distribution in respect of origin of 140 diphtheric outbreaks:—

January	4	May	6	September ..	11
February....	6	June	10	October	37
March	6	July	16	November ..	16
April.....	6	August	10	December ..	12

If damp is a factor essential to diphtheria, then excessive rainfall should be so also, and one cannot help suspecting that the phenomenal downpour at A——, occurring it should be noted in the month distinguished by the number of outbreaks commencing in it, had some effect on the character of the epidemic at A——. This epidemic was, in fact, what I have termed 'explosive'. If we illustrated its progress by a curve, that curve would be remarkable for abruptness of ascent, acuteness of apex, and rapidity of decline. I cannot attribute this altogether to the measures taken; the schools were not closed until after October 30th, yet no fresh house was attacked after October 28th; isolation of infected children was, of course, practised as much as possible, but scientific isolation is, according to my experience, more difficult to obtain in diphtheria than in any other zymotic; moreover, in several instances, children in the same house mingled freely with their infected sisters or brothers, and yet escaped. Further, two slight cases, one early in December, the other at the end of that month, have occurred since, and prove, I think, that the specific contagium survived in the village—possibly to leap again into activity under future favourable conditions. These considerations, I think, tend to show that something more than the mere presence of the contagion is necessary for the production of an epidemic of diphtheria.

There is much evidence, I think, that the microbion of diphtheria can, and does, exist in suitable 'haunts', outside and independently of the human organism, and that, somewhat as the spores of common *mucor* or *penicillium* are ready to develop and fructify when conveyed to a congenial soil, so under favourable circumstances, in which probably season, climate, and family or personal peculiarity of constitution play a part, this diphtheria microbion may attack the human subject. Then, developing in its favourite habitat, its transference from one individual to another by ordinary personal contagion is a matter which depends on opportunity, and that sum of unknown conditions which we call 'epidemic influence'. Now, although last autumn was in my district characterised by a certain degree of diphtheria activity, there was not manifested that facility of diffusion which characterises an epidemic cycle of this disease. I cannot but think, therefore, that the sudden increase of the poison for a definite and limited period in A——, was due to some temporary auxiliary influence, and under the circumstances it would appear reasonable to associate this with the phenomenal rainfall.

I have always insisted on the danger to the public of slight unrecognised cases of diphtheria, or rather of contagious cynanche, for I do not regard the formation of membrane as a necessary or even usual feature of this disease. The present outbreak illustrates this, for the cases at the first house were so slight at the time—although the children remained weakly for a considerable period afterwards—that the patients did not keep their bed.

A man, who lost three children in this outbreak, lost two (by a former wife) in the malignant epidemic of 1859. He was then living in A——, but in another house. This is a good illustration of family predisposition to fatality, as the complicating question of special virulence of the contagium (independently) is to a certain extent eliminated.

* This child appears to have had a cold at the time of her cousin's arrival. It is uncertain on which day the specific symptoms commenced. From what I can gather swelling of the cervical glands came on early in the week. I have, in the course of my experience, met with two good instances where the incubation period of diphtheria was only *one day*. Scarlet fever may have an equally short incubation. I have recently had an example in my district.

Perhaps the most important lesson suggested by this outbreak is the apparently prolonged period of infectiousness after a slight attack, in the case of the boy who appears to have conveyed the contagion to A——.

SANITARY INSPECTION.*

By Professor FLEEMING JENKIN.

I HAVE come here to-day, ladies and gentlemen, to explain, to those who are ignorant of the matter, first of all, why we now require sanitary inspection, and, secondly, how it can be carried out and practically obtained.

The first question is one very necessary to answer, because, after all, we know very well that long ago people lived a long time, and, if we go abroad, we find the towns in anything but a savoury condition, and yet people in these houses live to a very fair old age. In many parts of the continent, where you will meet with bad smells to a very great extent, they are quite as free from diphtheria and such diseases as we are here in England. The truth is, that the danger which we have to fight against is not the danger of bad smells, but is one which is consequent on the introduction of water into our houses. That is the origin of the whole matter. So long as water was not brought into the houses there was comparatively little danger of propagation of disease by those means against which I have to warn you. This is the explanation of the fair healthiness of many of these bad-smelling towns, and I feel quite convinced that, in the course of the next ten or twelve years, in France and Belgium, as water is gradually introduced, the towns will become more and more unhealthy. The change is already felt, for instance, in Brussels. When there was scarcely any house in a town which had water laid on, it was quite unnecessary to have any channels from the house to convey the water away. Now, we all take in a large quantity of water. Sometimes forty gallons per head, and this has to be taken from the house. It has to be conveyed away by what is commonly called the drainage of the house. The water comes in clean and goes out dirty into a common receptacle —the street drain. These drains are all joined by communicating with a larger common receptacle. What is the effect of this? These large common receptacles, even when in good order, receive, from a certain percentage of houses, germs of disease: that is to say, they receive germs or seeds capable of propagating these diseases. Of germs we know little, but we may take it as an experimentally proved fact that the seeds of certain diseases are conveyed along with the gases generated in sewers; and, if we breathe that gas or even air tainted with that gas, we run a certain risk of contracting these diseases. Again, if water is exposed to the gas containing germs, that water becomes poisonous. If we drink it, we are extremely likely to contract that disease. There are only certain diseases thus propagated, but these are very dangerous ones. We must also admit that the gas from a particular sewer may not for months at a time contain the germs of these diseases, but the larger the number of houses communicating with this common receptacle, the street sewer, the greater is the probability that the sewer-gas will receive and convey germs of disease. So long as there was no drainage, and all refuse was thrown into the street, you might have had smells, but you had no channel connecting your own house with half a dozen others, where there was disease. Now, the connecting channel does exist. It is extremely difficult to form a sufficiently vivid picture of the danger to which our modern system exposes us. You must imagine a large receptacle in this street, charged with dangerous matter; pipes from this receptacle lead the dangerous matter to all parts of this house, ending in sinks, basins, and other conveniences, forming, perhaps, twenty little sources in the house, through any one of which this dangerous material, sewage-gas, may enter. Any one of the pipes mentioned may be imperfectly closed at its upper end, and may not only allow water to flow down, but gas to flow up. Again, any one of the pipes may have a hole in it. It may have been good at first, but may have decayed, so as to give an outlet for this dangerous gas. All this complex system is introduced in consequence of the enormous quantity of water which we now think it necessary to use. One remedy proposed is that we should not have any drainage; that we should again go back to the old system, and use dry earth in water closets. This, I consider, is impossible. Not, as some say, simply because of the amount of earth which would have to be carried to and from the town. That could be got over. There is a much greater difficulty. If the water comes into the houses it must be taken away. You may have receptacles to receive fæcal matter, which is particularly dangerous, but even then you cannot prevent the water which comes into your house being contaminated and becoming a source of danger. If there is disease in the house, some of the infectious matter will certainly go down the drain which takes away the dirty water, even if dry earth were used in closets. The sewers, with all their connected pipes, would be little less dangerous than before. The danger is extremely insidious. The popular impression is that, when there is no smell, a house must necessarily be in a comparatively safe condition. This is a complete and absolute mistake. Sewage-gas has not a particularly bad smell. You may have heard of pleasure-parties going down to see the large sewers in Paris, and no doubt there are sewers in London where the air is not as unpleasant as in many parts of the Metropolitan Railway. It is not because of the bad smell that sewer-gas is dangerous, it is because the germs of disease are likely to be present. Another thing I may mention is that the human frame is much more likely to contract disease when asleep than when awake. The same men who work with impunity inside the sewers, might contract disease were they to sleep in a room, the air of which was purer than in the sewer.

There being this real danger, which I think I need not now prove by statistics, let us see what is the plan that has been proposed to counteract it. In the main, it may be said that it has been to interpose a little contrivance, known as a water-trap, at the end of each pipe (model shown). This trap is practically a cork, or stopper, made of water, or, as it is sometimes called, a water-seal. This device is perfectly effective provided one of a great many things does not happen, but it is a very weak cork; one, if I may put it so, which is easily drawn; and I may mention a few of the ways in which this contrivance is apt to go wrong. The maker may send you a trap imperfectly constructed, in which the dip does not come down below the overflow, and no one may happen to observe it, and the sewage-gas is

* Abstract of a lecture delivered before the National Health Society, April 22, 1881.

free to pass into the house. Another thing that happens is that the pipe, not being used for some time, the sealing water dries up, and then, as you will readily see, the device is useless. Yet another thing is that, if the gas presses against the surface of the water, with a certain force, it may blow it back. This action is not at all infrequent in towns where sewers are not ventilated, as, I am bound to say, they are in London, and is often caused by the wind blowing against the open sea end of the sewer. Where several traps are placed on the same pipe, still another danger is introduced, as these, acting on one another, may, as it is termed, become 'unsyphoned'. Again, a little bit of cloth, lying over the edge of a trap, may suck it dry, as you may have seen the water drawn from a flower vase by leaves hanging over the edge. A certain amount of gas will even pass through the water.

I think I have said enough to show that this small cork of water is not a contrivance which can be relied on with absolute certainty. This consideration has led a certain number of people to give up traps altogether; but this is a short-sighted way of dealing with the matter. They take certain precautions mainly for flushing of the drain-pipes and letting in large quantities of air, and then they say, 'Really these pipes are so clean that we do not care whether they are in communication with the inside of the house or not." Now it is quite impossible, by any means of flushing and aërating of pipes, to keep them clean. Like traps considered alone, flushing and aëration are only partial safeguards. Let us combine all safeguards; we will first isolate each house from the public sewer as far as practicable. Then we will trap every inlet to the drains down which dirty water is poured from the house, and then we will so flush and aërate each pipe as to reduce the danger to a minimum when any of these traps fail. In this way we guard against the common source of danger of the common sewer, and the private source of danger, the domestic system of pipes, when these are tainted by disease occurring in the house itself. The isolation of the house from the main drain is carried out by a plan which I may describe as, first of all, allowing the drain to discharge into the open air or into what I may call a little pond, and then allowing this open pond to empty itself into the public sewer; then, if any germs do come from the sewer, they will be given off at the surface of the pond, and not given into the house. Even then, in places where it is not possible to have the little pond of considerable size, it is still possible for germs to be carried over the free surface into the pipes inside the house; and, unfortunately, germs have the power of multiplying. They may be few at first, but if a very small number of germs be introduced into sewerage, they will propagate, and there will soon be many. Thus it happens we must fight, not against the introduction of many germs, but against the introduction of any. We are forced to take double precautions. We should not give up either the open pond or the traps inside the house, and yet all our precautions may fail; therefore let us never, on any temptation, introduce water-closets, or any other pipes leading down to drains, into our bedrooms.

The last precaution which we require to take is to have the apparatus, that are introduced into our houses, inspected by some one who knows, first of all, whether the design of the apparatus is good, and, secondly, whether it is in good order. I may say that the necessity for this inspection first became evident to me when I was asked to give a couple of lectures on sanitation in Edinburgh. It seemed to me that sanitary engineers had made far too great a mystery of their art. I thought I could make all the details perfectly clear in a couple of lectures. We have to bring in clean water, and to take care that this is not contaminated, before it is drunk, by communication with the drain. The next point is to see that all foul matters really do leave the house. It is also very necessary to see that the pipes are really sewage-tight. Not very difficult points, I thought. When I got my diagram for the illustration of this lecture completed, it contained three systems of pipes, channels, etc. Pure water was represented by white. In yellow, I showed those channels which contained such water as comes from sinks, lavatories, and so forth, the less dangerous matters. In red, I showed those channels which conveyed the more dangerous sewage, or fæcal matter.

I now began to see that the matter was not so simple. I found that the details which the householder was expected to know were really more numerous than he could be expected to master. I also found another failing, viz., we are, none of us, fond of taking trouble. I asked myself 'how often have I inspected my own house', whilst I am preaching to others. I found I was not taking the precautions which I was recommending my neighbours to take. Something more was necessary. Were we to send to the plumber? Plumbers are not popular. On the contrary, I find nothing so popular as round abuse of the plumber. I believe, in reality, he is just as good as his neighbour; but the plumber has not often the necessary knowledge to enable him to design the work, and in some cases, where the master plumber has the knowledge, he cannot, and does not, visit each house; he simply sends round a man who does the work well or ill. Moreover, the man who executes work should never be the man to certify its merit. The best contractor always works better under supervision.

Were my friends to call in an engineer? That would mean a large fee. Then the idea occurred to me, that by taking advantage of co-operation, it would be possible to get cheaply some one with the necessary knowledge and standing. Someone above suspicion of bribery who would do what I now despaired of seeing the householder do for himself. This conception led to the Sanitary Inspection Association in Edinburgh.

Inspection has two objects. The first, to see whether the apparatus in the house are well designed. The second object, and I hold the main one, is to ascertain whether all the apparatus remain in proper working order. Whether the traps are habitually filled with water? Whether the pipes are gas-tight, or worn through? Whether the joints are broken down or not? Whether the pipes originally open, remain open, and continue to take away the sewage? This, I consider, the main object of inspection associations, of which there are now several.

With reference to the first object of inspection—the inspection of the designs—I am continually met with the statement that, 'doctors differ'; that every engineer gives different advice, and people must really be satisfied with houses as they are. It is true that my professional brethren do differ upon certain points; but, behind this, there is a vast mass of undoubted fact, upon which every one worthy to be called an engineer, is perfectly agreed. No

one would be so foolish as to deny that pipes in a house should be water-tight, that they should be laid so as to enable water to run through them, that the trap should form a seal. No one denies at the present day the necessity of ventilating these pipes, and cutting off the drinking-water from all possible connection with the foul water of the house. The differences that do exist are upon very minor points. Some say one man's trap is the best; others another man's. The fact is they are probably both good. The main point really is to find out the gross faults which unfortunately do exist in many houses.

The moderate sanitarian suffers much from the enthusiasm of his more fanatical brother, who says that unless everything is done out-and-out it had better be left alone; so it is in everything. In politics we find the man who cares for no one Bill, but who wants everyone to be rich—everyone to be happy. He corresponds to the sanitarian who says that unless you take every pipe out of your house, remove every carpet, cover all your walls with tiles, and wash them daily with distilled water, and remove your home from clay to a gravel soil, you had better do nothing. This is the man who stops all progress. In any association with which I am connected, there is nothing of that kind. We recommend only what plain common sense would suggest to yourself if you only knew the facts of the case.

I will now read some extracts from reports of inspections actually made by the engineer of the London Sanitary Protection Association, which show that in some cases the house-drains had been found entirely stopped up; in others the soil-pipes had been found eaten through with sewer-gas; while, again, in many cases, there were no disconnecting traps, and no ventilation for the drains. In some other cases even the bell-traps have been found in cellars dry, from one of which in particular there was a blast of sewer-gas sufficient to extinguish a candle. Another instance, a soil-pipe built into a wall was discovered by the peppermint test to be in a very bad condition.

About 6 per cent. of the houses inspected so far, in London, have been found not to be drained at all, that is to say, that the drain going from the house was in these cases found completely choked. But where, then, does the matter go? The joints of the pipe are imperfect, and all the liquid oozes out, the solid matter remaining in the pipe, choking it more and more; and this may go on for several years before anyone in the house is aware of the stoppage, unless someone becomes ill.

About one-third of the houses inspected have had holes in the soil-pipes through which sewer-gas was blowing into the houses. I think I am hardly violating confidence when I say that in two of the houses of our own members of council this was found to be the case. About 40 per cent. of the houses have connection between the cisterns of drinking-water and the soil-pipes. I think that these figures alone are sufficient to show that inspection is a desirable thing, even if it were limited only to the first inspection; but I trust anyone who has his house inspected for the first time will not stop there.

There are stronger reasons for shirking the first inspection than any other. The first inspection is almost sure to disclose some faults, and then people are forced, not certainly by the association, but by their own consciences, to incur the expense of putting it right, and the fear of this deters, no doubt, a considerable number of people from having their houses examined. I must say I do not understand their difficulty, because, when they get their reports, it is for them to judge whether they act upon them or not. In each case it is for the householder, using his common sense, to decide whether the particular change recommended is worth making or not.

The truth is, I apprehend, the chief obstacle that stands in the way of the introduction of this system of inspection is a sort of disbelief in the people who are to carry it out, and that is a subject upon which it does not become me to speak in as strong terms as, perhaps, I should like to do. At any rate, associations which have been started try as far as they can to give the members a guarantee. The guarantee is this, you have a dozen leading citizens—men who have paid some attention to this subject. They select an engineer who is to lay down the principles according to which these inspections are to be made, and inasmuch as he does not take the trouble to go through the houses, but merely lays down the principles, and looks through some of the reports it is not necessary to pay such a man very highly, although he may be a man of position. Then they appoint an actual inspecting engineer. They see his reports from time to time, and I think the householder has a better guarantee than he would if he merely went to some young engineer and said, 'I will trust to you to come and inspect my house, and point out what is wrong.'

If it is certain that he does know his work, no doubt it is safe to go to the independent engineer. He can give his client the whole of his money's worth, and I would not deter any one from going to him. But, suppose one do not know such a man, probably every one knows Professor Huxley or Sir Joseph Fayrer, and know that they are, to a certain extent, responsible for their engineer. This is the only reason for having associations. You have the guarantee that the appointments are at any rate intelligently made. If you employ an engineer of sufficient standing to be known, say Mr. Rawlinson, you must pay him engineer's fees, whereas by taking advantage of the association you have a guarantee that the principles applied are those of an engineer of standing, and you save money by the principle of co-operation, and by employing a corresponding young man to do the practical work. This is just what is done in every engineer's office. All the details are done by young resident engineers, employed by the heads of firms. The principle is exactly the same.

We fall in a certain measure between two stools. We meet with people who do not care about these subjects at all, and so will not be inspected, and those who think they know all about them, and who think they require no advice. I do not think that people should be their own lawyers, doctors, or engineers. I think a man should not undertake the engineering of his own house if he can get an engineer to do it for him. I trust that when the work of this association becomes known, the same sort of confidence will be felt in London as in Edinburgh, and that it will become almost as much a matter of course to have one's house annually inspected, as to have it insured against fire. The charge is a very trifling one. Our first inspection costs two guineas; after that, one, for every house of rental under £400 a year.

The association also gives help on ventilation and heating. I shall conclude, by mentioning a few of the public buildings which have been placed in our hands in the North, and this will, I think, show you that there the association has thoroughly secured the confi-

dence of the public: The New University Extension Buildings; part of the New Royal Infirmary; the Cumberland Infirmary, Carlisle; the Sunderland Infirmary; Chalmers' Hospital; Longmore Hospital for Incurables; the Maternity Hospital; Royal Sick Children's Hospital; Convalescent Hospital, Gilmerton; the Cripples' Home; British Linen Company Bank; Union Bank; branch, Union Bank, Downie Place; branch, Royal Bank, Portobello; branch, Clydesdale Bank, Mid-Calder; offices of Heriot's Hospital; offices of the Scottish-American Investment Company; offices of the Scottish Equitable Life Assurance Society; offices of the Royal Society; offices of the Edinburgh and Leith Gas Company; and the offices of the Training College, Chambers Street; and Merchiston Castle.

POSITION OF THE PARLIAMENTARY BILLS COMMITTEE OF THE BRITISH MEDICAL ASSOCIATION

WITH REFERENCE TO LOCAL LEGISLATION AS TO INFECTIOUS DISEASES.

By ERNEST HART, Chairman of the Committee.

THE following is the abstract of a statement made to Mr. Dodson, President of the Local Government Board, at a recent deputation:—

The Parliamentary Bills Committee, in its duty of watching all bills introduced into Parliament touching the medical profession, has had its particular attention drawn to the very extensive and important alterations in the general public health law of the country which are being made under cover of local bills, necessarily passed through Parliament with the very smallest opportunity of public discussion.

The Committee freely admits the deficiencies of the Public Health Act of 1875, and some of the alterations of it made in these local bills meet with its cordial approval.

On the other hand, it has observed with distrust the evident desire of Sanitary Authorities who can afford the expense of a local Act to make all kinds of unnecessary and confusing alterations in an enactment which, when passed, was intended to be general in its application, and not to be locally altered at the caprice of any Sanitary Authority.

Many of the clauses which have received the assent of Parliament in these local Acts are of a singularly unpractical nature, and a manifest tendency has been shown on the part of certain authorities to shift the responsibility of checking infection from themselves to individuals.

Before an authority has any moral right to impose restrictions upon individual movements in the case of epidemics, it clearly ought to have fulfilled its own duty of providing the necessary appliances, such as hospital accommodation, disinfection apparatus and the like, for checking the spread of the disease.

Numerous authorities have neglected to see matters in this light, and whilst taking powers for requiring the notification of all cases of infectious disease, for closing schools, shops, dairies and similar places, for making stringent regulations as to infected houses, etc., have practically nullified the usefulness of these powers by neglecting to provide the sanitary appliances without which any attempt at the exercise of these exceptional powers must prove largely futile.

The Parliamentary Bills Committee wishes to see order in these matters. It desires that authorities should not have such large powers over individual action without performing a corresponding and precedent duty of their own. It considers that inasmuch as detailed local opposition to these bills in Parliament must needs be expensive and precarious in result, it is its duty to submit to the Local Government Board the necessity of providing for some effective supervision over such bills.

The Committee desires to see the provisions of these Bills more uniform. It regards the manifold but petty differences in local clauses having the same object as unnecessary and embarrassing; and, seeing the dimensions which local legislation of this sort is assuming, it thinks that the time has clearly come when the Local Government Board should review their present position in the matter, and take such steps as seem to them needful to ensure reasonable uniformity and reasonable consistence in local bills.

The two reports presented to the Committee by its Chairman abound with instances where wrongheadedness is apparent in requirements which are now law in the places affected, and which cannot be reversed without the trouble and expense of another local Act. It submits that the Local Government Board should be able to exercise more effectual control over clauses in these local Acts that are either mischievous or unnecessary, and it suggests whether, in every case of the kind, the Board could not be heard by Council against such clauses.

The Committee desires, at the same time, to draw the attention of the Local Government Board to the need for an early revision of the present public health law. It especially indicates, as worthy of attention, the giving of power to sanitary authorities to require cases of infectious disease to be reported to them, without the expense of a local Act. This might easily be done if the Local Government Board were able, on the application of an authority, and after inquiry by an inspector, to declare such notification in force within the district. Other matters needing attention are (1) the power of closing schools, shops, and other similar places, upon proved local necessity, (2) greater distinctness in the provisions relating to compulsory removal to infectious hospitals, and (3) the appointment of a minimum height of rooms. The Committee refers to these questions as specimens of the difficulties at present felt by local authorities in carrying out their functions, and asks that the amendment and strengthening of the Public Health Act may receive the early attention of the Government.

In the Report on the London Water Supply, from January 20th to February 19th, presented by Mr. Crookes, Professor Odling, and Dr. Meymott Tidy to the President of the Local Government Board, it is stated that, although many of the samples examined were more or less turbid from finely-suspended clay and sand, nevertheless the water supplied during the month was wholesome, of good quality, and well oxygenated. The examiners account for the turbidity, at any rate in part, of many of the waters by unavoidable conditions consequent on the severe frosts.

Herr Friedrich Siemens, of Dresden, has devised a gas-burner of remarkable intensity. He maintains a high temperature by introducing air previously heated by the waste heat of combustion. A burner of 500-candle power has been produced, and it is stated the quantity of gas used is small.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

V.—LAMBETH HOUSE DRAINAGE, DRAIN-PIPES, &c.*

WITH respect to the quantity of articles of one kind manufactured at a large sanitary establishment, drain-pipes always take the lead, and the reason is very evident. It would not be hyperbolic, therefore, to say that on the banks of the Thames at Lambeth millions of this commodity might be counted, the interior diameters of which would range from two to twelve inches, whilst a very considerable number of them would range between twelve and thirty inches; and such are the facilities now commanded, that there can be no question that, were such a thing needed, pipes of twice this last sectional area would be turned out of hand at Messrs. Doulton's drain-pipe manufactories.

The criterion of a good drain-pipe lies in its straightness, in its absence from warp, and in the trueness in which the end of one fits into the socket of another. I am now alluding to glazed and socketed drain-pipes, as any other class would be applicable solely to agricultural purposes, or for sub-draining the sites of houses about to be built on somewhat too damp a ground. The usual practice, as everyone knows, is to cement the joints, luting them all round, and carefully cleaning out the inside of the pipe, so as to avoid fringes which would impede the flow of the wastes. It is also wise, when laying down a pipe-drain, inside or near a house, to allow it to rest upon a bed of concrete, and when duly and well laid to surround it with a few inches of the same material. The non-performance of this necessary rule has done much to bring drain-pipes into disrepute, and some advanced engineers are seeking to replace earthenware pipes by pipes of iron. The latter may be advisable when the pipes must perforce stand exposed in a basement; but if an ordinary well made glazed and socketed drain-pipe be laid in a workmanlike manner, there is no occasion to revert to the use of a gas or water pipe calculated to withstand great pressures.

In order to prevent the evils possible to a badly laid down drain—and these evils ought to be entirely eliminated, even when an ordinary drain-pipe has been used—many kinds of improved joints have been introduced to public notice. The one mostly in use is that of Mr. Stanford, manufactured by Messrs. Doulton. This pipe may be briefly described as a pipe which has been turned in a lathe, a suitable substance being added on the inner lip of the socket, and on the outer edge of the plain end of the pipe, so that when two pipes are put together they fit so closely as to form a perfectly tight joint, and certainly so, if a little prepared grease has been added, and a cement luting outside as well. These improved pipes are used where extra care is needed inside a house. They are also largely made use of as upright soil-pipes, built into a chase in the wall, for ventilating-pipes and the like.

When laying down a drain, one of the most important adjuncts is the possession of good bends or curved pipes, enabling the workman to effect a perfectly regular diversion of a straight line. The forms of these bends vary somewhat, Fig. 1 being used

Fig. 1. Fig. 2. Fig. 3.

where a quick curve is required, Fig. 2 where the diversion is less, whereas Fig. 3 accommodates a very simple deflection from the straight line. Fig. 1 is also immensely useful in grease-trap collections, inasmuch as one end can be dipped below water line, and thus prevent an influx of foul air from the drain into the grease-collecting chamber.

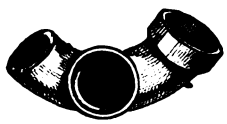
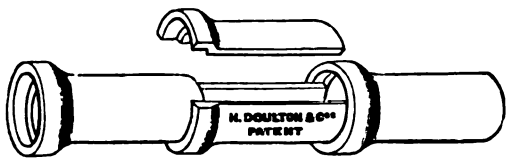


Fig. 28.

Modern sanitary requirements have lately pointed to a necessity for using a bend, in some cases, with an inspection aperture above, which can be closed over with a cap set in mortar. Such a bend, with the wished for inspection hole, can be seen in Fig. 28 above (Doulton's list), and inasmuch as the cost is only about double that of an ordinary bend, it will shortly come into almost universal use in laying down drains where many curves obtain.

Inspection of a drain-pipe formed in a straight line is equally necessary at times, and, therefore, means have been taken to arrange for a portion of the pipe to be laid bare, without having recourse to



breaking the pipe open. Among pipes of this description the opercular or lidded pipe, patented some years ago by Messrs. Doulton, is the best for the purpose, forasmuch as a small top segment can be removed, thus allowing the pipe to run nearly full during the time occupied by the inspection. It is now quite a common practice to make a free adoption of these lidded or capped pipes in a line of drain, so as to be able to remove any obstruction readily, either by the hand or by the aid of jointed sweeps' rods.

It would of course be easy to predict that no good drain could practically be laid down in or around a house unless proper junctions of all kinds were forthcoming. Fortunately, these are to be had of all

* For Doulton's new Pipe-joint, see 'Sanitary Patents', No. 3567.

imaginable kinds, and that is saying a great deal. Figs. 4 to 6 show single junctions, the common pipe, that is to say, with square, oblique, and curved outlets. There are also double junctions, with two out-

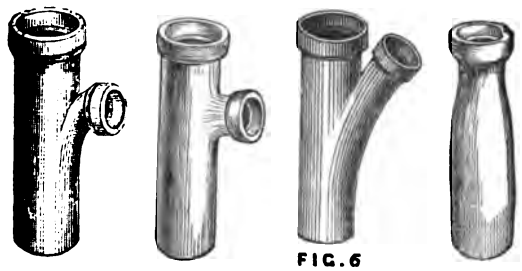


Fig. 4. Fig. 5. FIG. 6 Taper Pipe.

lets, which are largely used in house drainage. There are also the **T**-shaped, the **Y**-shaped, and the **U**-shaped junctions, and they all fulfil some part in drainage economics.

When the drain has been laid as far as the sewer or outfall, it becomes necessary to fix a flap or valve-trap of some kind. In the case of a sewer entry, this prevents the return of any foul air there, and when the outfall is in the open air it prevents a draught and air-compressing current up the pipe when the wind is in the direction of the drain. It will also serve to keep out rats and other vermin, and in sporting counties effectually bar out foxes. Figs. 16 and 17 illustrate stoneware pipe and valve-

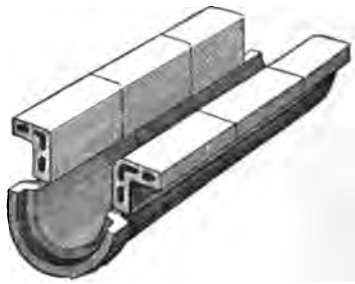
Fig. 16. Fig. 17.

traps used in ordinary drain-laying. They are excellently well made, with ground surfaces upon which the galvanised iron flaps fall, and with gun-metal eyes. Their adoption is made compulsory in all London sewers; but this portion of the work, technically called 'putting the eye in', is executed by the Parish Authorities themselves, and with every propriety too. When the drain is a long one, and debouches into a piece of suitable land, the flap is occasionally wedged back until some accumulation of sewage matter has collected in the pipe, whereupon the wedge is withdrawn, and the sewage turned into a channel pipe for distribution over the land.

Socketed Channel Pipe.

A channel or half open pipe, with socketed joints, is figured above, and where it is found advisable to waste the liquid as it flows along, so as to saturate the ground, plain pipes, without sockets and with butt joints, are used.

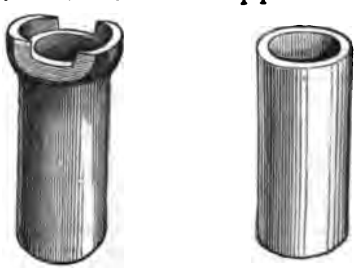
This method of apportioning water-carried sewage to the land is, however, of a somewhat makeshift character, and suitable only for small collections of sewage. Indeed, this open channel pipe was not specially devised for irrigation purposes. Specially contrived conveniences have therefore been manufactured for sewage conduits, made in best glazed stoneware. Such a ready method of constructing



Patent Conduits.

channels for sewage irrigation is figured above, and, as will be seen, moulded copings, cast hollow, to render them less ponderous, and flanged to provide a footway, if necessary, are provided. The channel can also be deepened by the insertion of intermediate hollow tiles between the coping and the top of the socketed or butt-jointed half-round pipe; and, in order to stop, regulate, or divert the sewage distribution, Messrs. Doulton supply stoneware sluice-valves of very easy adaptation to the conduits which are supplied by them. These stoneware conduits are much more serviceable than any form of trampled earth or brick; the former being apt to be trodden down, and the latter to become fouled by encrustation and fucoid growths, giving off an offensive smell, especially in the summer time.

It would be tedious, if not quite superogatory, to figure and describe all the combinations of pipes and connections used in sanitary work, for they are well known; neither would the perusal of a paper treating solely upon them prove interesting reading. Suffice it to say, that every sort is manufactured by Messrs. Doulton & Co., many kinds being special manufactures. I cannot, however, close this section of the Lambeth productions without a mention of the pipes used for lining or forming flues for fire-places. The use of these pipes is to provide a



Flue-Pipes.

cleanly flue, to avoid the necessity for parging, which frequently decays with damp or is burnt up. These pipe flues are also most useful in increasing the draught, and are easily swept. They are made in sizes having a bore of 9, 10 and 12 inches, and whole socketted, with the sides, however, cut off, or with plain butt joints. Their adoption ought to be universal with architects and builders.

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ON THE POLLUTION OF WELLS IN THE LOWER GREENSAND.

By Rev. J. H. Timins, M.A. Trinity College, Cambridge, F.G.S.

Student of St. Thomas's Hospital, London.

The lower greensand formation consists of three strata, of which the aggregate thickness, when not altered by denudation, is from 200 to 250 ft. It is well exposed in the railway cuttings between the Wrotham Station and Maidstone, the upper beds near Wrotham Station, the middle beds in the short cuttings before and beyond Malling Station, and the lower calcareous beds, or Kentish rag, near Barming Station.

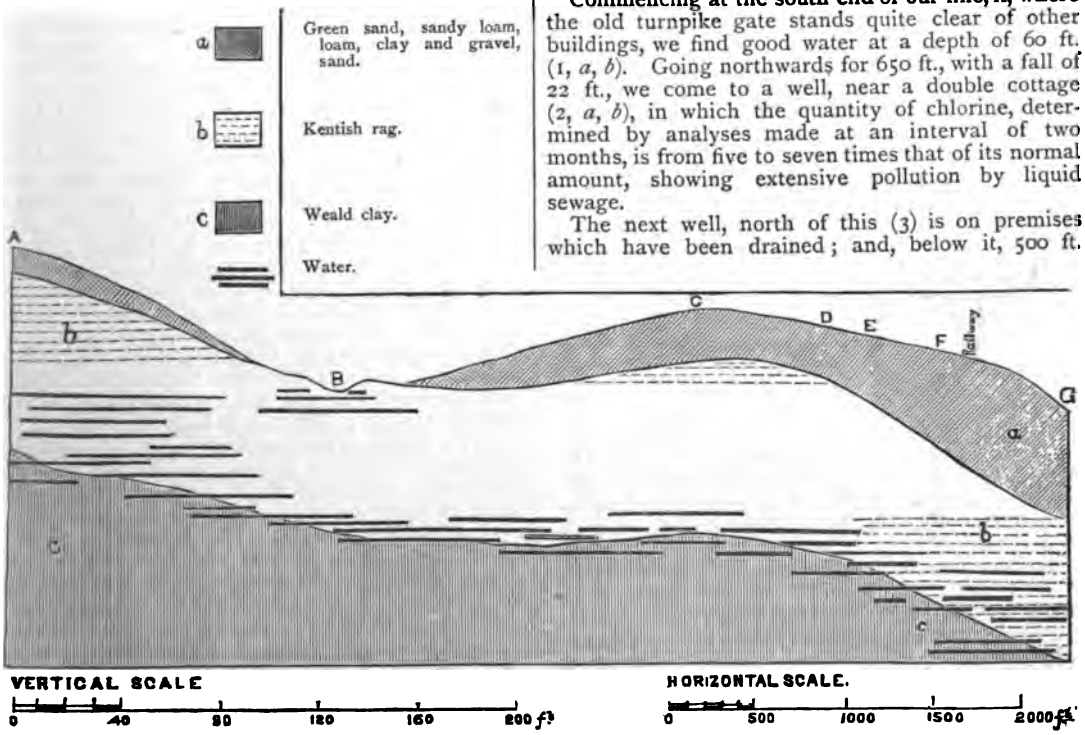
The object of this paper is to show the nature of the pollutions to which well-water in these strata is liable, and the extent to which organic matters passing through the soil become innocuous by oxidation, by determining the amount of past and present animal contamination of the wells and springs in the Kentish rag districts of West Malling, within an area extending 6,000 ft. from north to south, by 1,000 ft. from east to west, and of the adjoining parish of Offham; and by a similar examination of wells in the middle beds of the lower greensand north-west of Malling, and in the upper beds near the Wrotham Station at Borough Green.

The result of analyses made for this purpose is given in the following table. One of them (11, *a*) was made by the Kent county analyst. For the others I am responsible. I found no appreciable metallic impurity in the calcareous beds, and no free acid excepting carbonic. The hardness varied but little, being from 18 to 22 temporary, and 4 to 5 permanent hardness.

Referring to the geological section, in which I have shown the general character of the stratification along the line of road passing through West Malling and the hamlet of St. Leonards on the south of it, it will be seen that there has been a subsidence of the Weald clay towards the north (or an elevation towards the south, whichever it may have been) of about 60 ft., causing a corresponding depression of the strata of the lower greensand. Such variation of level has led to a difference of depth, and to the formation of subterranean currents in the water-beds. When the natural reservoirs on the Weald clay are tapped, the water rises in the wells from 10 to 40 ft.; and when, as is commonly the case, an abundant supply of water is obtained without going down to the Weald clay, the water is found to flow into the wells from one or other of their sides, and sometimes to pass through them in a continuous stream. In consequence of this subterranean flow of water, wells are sometimes polluted at a considerable distance from the source of their contamination; and other wells undergo little or no pollution from cess-pools placed within a few feet of them.

Commencing at the south end of our line, A, where the old turnpike gate stands quite clear of other buildings, we find good water at a depth of 60 ft. (1, *a*, *b*). Going northwards for 650 ft., with a fall of 22 ft., we come to a well, near a double cottage (2, *a*, *b*), in which the quantity of chlorine, determined by analyses made at an interval of two months, is from five to seven times that of its normal amount, showing extensive pollution by liquid sewage.

The next well, north of this (3) is on premises which have been drained; and, below it, 500 ft. north of the cottage well (2) above mentioned, and with a fall from it of 15 ft., and proportionably less depth of the well, is one (4) in which the quantity of free ammonia indicates the access of sewage which can have undergone but little oxidation by filtration through the intervening rock. North of this, 560 ft., with a further fall of 22 ft. (at B on the plan), the upper part of the Kentish rag has been removed, with the overlying strata, by denudation, and the springs come to the surface. The first of these (5) is a dipping-well by the roadside. A spring which rises 150 ft. north of this, in private grounds, is remarkably pure (6); and a third (7) rises at the pond-head to the eastward, and is used as a dipping-well. These



GEOLOGICAL SECTION.

springs are the source of a considerable stream, which is banked up, for some distance, so as to form a pond, in passing through which the water becomes polluted (8). This sample was taken from the stream

	Date of Sample.	Chlorine grains per gallon.	Parts per Million. Ammonia. Free.	Albuminoid.	Total combined Nitrogen.
1, *a*	Dec. 13, 1880	1.6	0.01	0.06	1.5
b	Feb. 14, 1881	1.4	0.01	0.06	0.7
2, *a*	Dec. 13, 1880	9.0	0.00	0.08	13.26
b	Feb. 14, 1881	6.9	0.02	0.13	13.48
3	Jan. 6, 1881	1.45	0.00	0.08	3.98
4	Dec. 28, 1880	1.75	0.08	0.12	2.31
5	March 11, 1881 ..	1.2	0.01	0.03	0.88
6	March 12, 1881 ..	1.4	0.01	0.01	2.66
7	Dec. 30, 1880	1.4	0.01	0.06	1.00
8	Dec. 31, 1880	1.5	0.16	0.20	1.40
9	Dec. 10, 1880	1.5	0.00	0.02	4.69
10	Jan. 18, 1881	1.3	0.03	0.08	2.20
11, *a*	Oct. 30, 1880	1.55	0.94	0.43	not determined
b	March 7, 1881	2.0	0 01	0.04	4.31
12	Jan. 12, 1881	2.8	0.06	0.09	7.75
13	Feb. 18, 1881	1.9	0.00	0.04	1.89
14	Dec. 29, 1880	2.1	0.01	0.03	2.9
15	March 7, 1881	4.75	0.00	0.09	21.95
16, *a*	Jan. 31, 1881	3.9	0.005	0.13	30.13
b	March 14, 1881 ..	4.1	0.01	0.05	21 90
17	March 15, 1881 ..	4.0	0.00	0.07	28.93
18, *a*	Feb. 4, 1881	3.5	0.07	0.22	18.73
b	March 3, 1881	3.8	0 00	0.26	17.75
19	March 3, 1881	2.9	0.03	0.25	9.13
20	March 3, 1881	2.3	0.00	0.08	6.82
21	March 14, 1881 ..	1.5	0.00	0.06	2.27
22	Feb. 19, 1881 ...	1.3	0.01	0.09	4 69
23	March 1, 1881	2.0	0.00	0.14	4.25
24, *a*	Dec. 28, 1880	1.87	0.00	0.06	0.95
b	Feb. 11, 1881	1.45	0 01	0.07	1.30
25	March 4, 1881	2.0	0.03	0.10	8.59
26	Dec. 6, 1880	1.75	0.01	0.18	5.45
27, *a*	Dec. 4, 1880	1.8	0 04	0.18	8.15
b	Jan. 3, 1881	2.0	0.03	0.21	2.8
c	Feb. 23, 1881	1.8	0.00	0.18	3.94
28, *a*	Dec. 3, 1880	10.65	0.02	0.14	45.30
b	Dec. 14, 1880	3.3	0.00	0.18	4.74
c	March 10, 1881 ..	3.0	0.00	0.22	2.9
29	Feb. 2, 1881	2.1	0.00	0.14	3.83
30, *a*	Dec. 8, 1880.....	3.3	0.00	0.06	13.76
b	March 10, 1881 ..	2.2	0.01	0.25	4.45
31	Feb. 19, 1881	1.75	0.00	0.08	0.84
32	March 14, 1881 ..	2.3	0.00	0.04	7.96
33	Feb. 26, 1881	2.0	0.01	0.07	1.31
34	March 1, 1881	2.4	0.00	0.03	3.96
35	March 18, 1881 ..	1 8	0.00	0.05	2.93
36	March 16, 1881 ..	1.5	0.00	0.04	3.0
37	Feb. 15, 1881	1.4	0.01	0.03	1.65
38	Feb. 28, 1881	3.0	0.00	0.03	3.46
39	March 7, 1881	3.5	0.01	0.11	8.5
40	March 15, 1881 ..	2.2	0.00	0.09	27.09
41	March 2, 1881	6.0	0.14	0.42	7.75
42	March 4, 1881	6.0	0.08	0.26	17.21
43, *a*	Jan. 11, 1881	5.5	0.03	0.16	8.45
b	Feb. 16, 1881	5.8	0.01	0.38	33 61

1,500 ft. from its source, on a day when the water was clear, and at its purest. After heavy rains the pollution has been far greater. And when the stream has overflowed its banks, water from it has passed, scarcely changed, through fissures in the Kentish rag, into distant wells. Thus, on the 30th October 1880, after very heavy rains, I found two wells thus polluted; one of which was distant 415 ft., and the other 810 ft. west of the nearest part of the stream. The first of these I found, on analysis, to be loaded with organic matter and free ammonia, and, when microscopically examined, I detected the presence of numerous living pond-worms and insects, as well as fragments of pond-weeds. The other is the town-well. It is 440 ft. north of the well above mentioned. Its mouth is 40 ft. above the level of the stream; and the water in the well is 50 ft. below the stream. A sample of water taken from this on the same day, October 30, was much polluted (11, *a*), and the small quantity of chlorine showed that much of the impurity must be ascribed to pond-water rather than to sewage from cesspools. The communication between these two wells was proved by the water in the town-well having been lowered by pumping out the water from the other. This other is frequently polluted (10), although there is no source of possible pollution in its immediate vicinity.

At the south end of the town, C, the portion of the middle beds of the lower greensand which has escaped denudation, consists chiefly of sandy loam, 15 ft. deep, in which I have found remains of *Iguanodon Mantelli*. This sandy loam is sufficiently compact to hold water, and contains landsprings. At this part of the town, the sewage from the houses on the west side is carried off by the town-drains, and the water of a well here, which enters it from a spring to the westward of it, is good (9). The quality of the town-well, which is 200 ft. north of this is subject to considerable variation. One analysis (11, *a*) shows it at its worst; and another (11, *b*) at its best. A well on the east side of the street, 350 ft. north-east of the town-well, where drainage has been neglected, contained organic matter which could have undergone but little purification by natural filtration (12). But in wells on premises which have been drained, 80 ft. north of this (13), and again at 230 ft. further north (14), we find pure water; crossing Swan Street east, the water on the north side contained more organic matter (31); and 250 ft. further north, and from thence for 500 ft., I found evidence of extensive sewage pollution. The wells are from 85 to 110 ft. in depth. The water taken from the three first (15, 16, 17) had been much contaminated by organic matter; the greater part of which, however, had been oxidised during its filtration through gravelly clay and Kentish rag; though water taken from one of them, soon after the melting of deep snow, showed that the filtering power had been overtaxed (16, *a*). Otherwise, the water from these three wells would be pronounced organically safe, if we were to form our conclusions solely on the amount of free and albuminoid ammonia. But the total combined nitrogen, and the quantity of chlorine, indicate sewage pollution to a hazardous extent.

In the fourth of these wells (18, *a*, *b*) where the soil over the Kentish rag is sand, and in the well near the Smithy (19), north of the railway cutting, where there is about 40 ft. of sand over the Kentish rag, and where the well is 109 ft. deep, with 14 ft. of water, there has been far less destruction of the organic matter by oxidation, and the water in both of them was found to be seriously polluted by it; 400 ft. north of this well we came to the end of the town, G, where there is a well with only a few cottages near it. Even in this apparently safe position symptoms of incipient pollution are manifest (20).

Having completed our line from south to north, we have now to examine the wells east and west of it. Passing from C, westward, 450 ft., through the churchyard, we came to a single row of cottages, 590 ft. in length, with a fall of 10 ft. At the west end is another row of cottages, facing the road. There are three wells, about 75 ft. deep, sunk through 15 ft. of sand or sandy loam, and 60 ft. of calcareous rock. The two first are 70 ft. north of the cottages, and the third is nearer to them. The first (21) is 50 ft. from the commencement of the row; the second (22) is 300 ft. west of this; and the third (23) 180 ft. further west. There is no proper drainage. The degree of pollution is proportionate to the number of tenements in the vicinity of each well.

From D, a distance of 540 ft. westward, with a fall of 12 ft., brings us to the surface of the Kentish rag,

where there is a deep well, with adits, which was sunk about twenty-five years since to supply the town with water. It is at a low level, and no provision was made for distributing reservoirs, and no use is made of it. If the neighbourhood of it were properly drained, an abundant supply of very pure water might be supplied from this well (24, *a*, *b*). The sample, *b*, was taken after the melting of deep snow.

Near the junction of this road with the High Street, D, is the entrance to the back street. Not far from it, a well about 50 ft. north of the road to the gas-house (25), had undergone some sewage pollution, and in a well 80 ft. north of this (26); and in another, 190 ft. further on (27), the water was worse. As the amount of chlorine was not large, the pollution may have been partly derived from stables and dung-pits. From the result of a succession of analyses, made at distant intervals (27, *a*, *b*, *c*), it is evident that their contamination, whatever may have been its source, was constant; 350 ft. north of this well is the junction of this back street with Ryarth Lane, F; and the water there goes from bad to worse. The first well, 130 ft. westward (28), which is over 60 ft. deep, was evidently polluted by sewage to a dangerous extent. A comparison of the relative proportions of chlorine and total combined nitrogen, shown in the analyses, *a*, *b*, *c*, indicates the derivation of much of the nitrogen from urea. There has been, from time to time, much illness in this neighbourhood, including a case of enteric fever; and an epidemic of scarlet fever in the summer of 1877 assumed here an exceptionally malignant and fatal form. The water in a well, 270 ft. east of this (29), is much better; the owners of the cottages near it having lately attended carefully to their drainage. But on the other side of the lane, 140 ft. lower down, where the rock is very near the surface, and at no great distance from the outfall of the town sewers, is a well of which the water was again very bad (30).

Eastward from E, on the geological section, is Swan Street, leading to the railway station. It contains comparatively few tenements, and it is on the whole better drained than other parts of the parish; though, owing to the want of any proper water-supply for flushing the sewers and the connecting-drains, the drainage is nowhere perfect. From analyses of water taken from wells at its junction with the High Street (14, 31), and from thence for a distance of 563 ft., where we came to the rock, after a fall of 27 ft., it appears that the water is generally good. The same is the case with that of the well at the Police Station (34), about 350 ft. north of Swan Street, and at Malling Abbey (37), which is 350 ft. south of the lowest point examined (36), and like it, sunk entirely through rock.

The results of the examination of wells in the Kentish rag district of Offham, so far as I have yet made it, are very similar to those in Malling. An old well near some cottages opposite the rectory gate, which is 112 ft. deep to the surface of the water, and which was sounded to a further depth of 40 ft. without reaching the bottom, contained pure water (38). That from a well 100 ft. deep, on the Green, near a walnut-tree, was not so good (39). And the water from a well west of this, 120 ft. deep to the water, was still worse (40).

The examination of the calcareous beds of the lower greensand has taken so much space, that I can, in the present paper, only notice the middle and upper beds very briefly. I have already observed that landsprings occur in the compact sandy loam and yellow sand, which, in some cases, overlies the Kentish rag. Next above this, we find beds of stony clay and gravel, through which wells are sunk into the landsprings below them. I have given the result of analyses of two such wells, a mile north-west of G on the plan. The wells are 400 ft. apart, and 23 ft. deep. When the samples were taken the water had risen in the wells to within 5 ft. of the surface. The water was clear and inodorous; and no warning was given by taste or smell of its dangerous properties (41, 42). There was typhoid in one of the houses last year.

In the upper strata of the lower greensand, water is found in beds of hard white sand at a depth of from 60 to 80 ft. from the surface. I have given the result of two analyses of samples taken from a well about 500 yards south of Wrotham Station. The well is sunk through sand to a depth of 60 ft. I could hear of no cesspool within 40 ft. of it (43, *a*, *b*). The increase of organic matter, shown in the last of these analyses (*b*), was, doubtless, caused by the flood of water carried downwards through the melting of deep snow. Typhoid has been prevalent there.

The conclusions to which we are brought by the result of our investigations are—

That the filtration of water contaminated by organic matter through a depth of 60 ft. of sand, or of Kentish rag stone, is ordinarily sufficient for the oxidation of free ammonia, but not for the destruction of organic matter so far as would be necessary to make water, so polluted, organically safe.

That in the shallow wells in the middle beds, natural filtration separates solid from liquid matters in water polluted by sewage, so as to make it clear and palatable, but not so as to make it safe for dietetic purposes.

That the water of wells in the Kentish rag is liable to dangerous pollution, not removable by natural filtration, even at a depth of 100 ft.; and that such water cannot be regarded as organically safe solely on the result of the determination of the free and albuminoid ammonia, without reference to the total amount of combined nitrogen.

That the water of such wells may be contaminated by polluted streams, running over the Kentish rag, as well as by cesspools, at a distance of many hundred feet from the source of contamination; and, therefore, that, in populous places, where the water supply is derived from wells, any cesspool discharging its contents downwards, and any stream polluted by sewage, even though its water should not be used for dietetic purposes, in the Kentish rag districts, should be dealt with as a nuisance dangerous to the health of the neighbourhood.

The French statistical table of births, deaths, and marriages for 1879 has just been issued. Legitimate births numbered 869,400 in 1878, and the same again in 1879; illegitimate, 66,900 in 1879, and 67,700 in 1878; still-born, 43,800 in 1879, and 43,200 in 1878; and deaths, 839,800 in 1879, and 839,000 in 1878. The total increase of population is 96,600, compared with 98,100 in 1878. The marriages numbered 282,700 in 1879, and 279,600 in 1878. While illegitimate births throughout France, compared with legitimate, are at 7½ to a hundred, in Paris they rise to 32 to a hundred, or, of the total number of children born alive in 1879, viz., 68,000, there were 16,300 illegitimate.

ANTHRACITE COAL.

In a portion of the South Wales coalfield lies, according to the most reliable authorities, 'practically unworked', the finest bed of anthracite or 'stone coal' in the world, and, to use the words of Mr. C. H. Perkins, who read a paper on this subject before the British Association at Swansea in August last, 'The diamond of the British coalfield, so beautiful in appearance, so pure and powerful in combustion, and so cleanly in its nature.' With a slight exception, the 'stone coal' deposit of the British Islands is confined to a small portion of the district above alluded to, and this fact opens a wide field for interesting inquiry on the part of the geologist. Comparatively speaking, there are but few of us who have any knowledge of anthracite coal, though in America, both in Canada and the States, there are immense deposits covering hundreds of square miles in extent, and the fuel is commonly burnt, though it is generally admitted to be of an inferior quality to the fine veins in our own island. But there is a considerable difference in the quality of this coal as found in the Principality. Quoting from the authority before-mentioned, we find, 'That the quality of the South Wales coal ranges from the pure anthracite, or "stone coal", to the semi-anthracite or Welsh steam coal, and onwards to the highly bituminous or gas coal. There is also a considerable quantity of coal known as "bastard" anthracite, the quality of which is extremely inferior, for, while devoid of the purity and strength of anthracite, it does not possess the opening or swelling faculty of the steam coal, and decrepitates when burning to an unusual degree'. Judging from analysis, appearance, and general characteristics, these fuels are connected by the closest ties, and it is singular to observe the difference in 'grain', or the apparent constituents observable by breaking up a large piece of anthracite coal. Why this coal presents its particular features must necessarily be left in the main to conjecture.

Professor Dawkins says, 'The whole difference between anthracite coal and ordinary coal consists in this, that the bituminous portion of the anthracite has been removed in some way, while in the case of ordinary coal, the hydrogen and oxygen of the bituminous portion still remain.' From analysis we find that pure anthracite contains more than 94 per cent. of carbon, decimal 59 of sulphur, and only .98 of ash to 100 parts; the finest of the bituminous veins in the South Wales beds, viz., the No. 3, Rhondda, having only 72.73 of carbon, 1.17 of sulphur, and as much as 3.50 of ash, while a picked sample of Hartley's (Newcastle) presents 81.81 of carbon, 1.69 of sulphur, and 7.14 of ash to the same quantity. It will thus be seen that pure anthracite is far more rich in carbon, and has far less sulphur and ash than the best bituminous.

Anthracite coal must, however, not be confounded with South Wales steam coal, which is commonly used for steam ships, and in many instances for land engines. The analysis of one of the best veins of the latter gives 90.27 of carbon, 1.20 sulphur, and 1.25 ash, the remaining numbers, as in the case of the others quoted, being made up of oxygen, nitrogen, and hydrogen. But although there is only a difference of 3.91 per cent. of carbon in favour of the best anthracite, there is a wonderful divergence between the two in their combustible features. Anthracite, according to Dr. Percy, somewhat like 'bastard' anthracite, decrepitates, and may cause the production of fine particles to such an extent as seriously to check the passage of air through a furnace in which it is used for fuel, even when the air is impelled by a blast engine, the Welsh steam coal, on the other hand, possessing opening or swelling qualities to which the other is a stranger; and Mr. Perkins justly remarks that the returns known are so far unsatisfactory, and virtually asks the aid of the chemist to explain the discrepancy.

The use of anthracite coal in this country up to the present time has been mainly confined to malting, hop-drying, and lime-burning. Still, although practically undeveloped, we are told by the first-named authority that as far back as the year 1595 some of this coal was sent to London to the Lord Treasurer Burleigh, by a gentleman of experience, 'to show how farre the same excelled that of Newcastell wherewith the Citie of London is servid'; but it does not appear to have found much favour, probably owing to the tedious passage by which it had to be conveyed. Two hundred and fifty years later, Taylor, in his 'Statistics of Coal', says, alluding to the slight use made of anthracite, 'Yet, if we mistake not greatly, the day will arrive when this great metropolis, London, will seek from the mountains of Wales her supplies of a mineral fuel far preferable to that which from custom she now considers so valuable, and which from its imperfect combustion, among other causes, now darkens the air with smoke, and pervades a vast and densely inhabited area with its sooty and noxious particles.'

Thirty-six years have rolled by since these words were written, London has nearly trebled her population during the time, science has advanced perhaps in a more proportionate degree, and with but comparatively few exceptions we are still going on in the same old ways; and, but for the action of the recently-formed Fog and Smoke Committee, who are to a certain extent pledged to eradicate the foul nuisance, we might have gone on for generations in the listless, wasteful, and injurious path in which our forefathers were satisfied to live and die.

Thanks to the efforts of the National Health and Kyrle Societies; we are being awakened from our state of torpor, and both manufacturers and anthracite coal owners are working harmoniously together to endeavour to rid us of a most objectionable and health-destroying nuisance, and to enable us to use the fuel that countless ages have stored up for our benefit in a proper and economical manner. Although we have not by any means exhausted the interesting facts connected with anthracite coal, we have said as much as our space will permit us for the object we have in view. Slowly, but surely, the interest in anthracite coal has increased. Its use, and that of steam coal, for domestic purposes in South Wales, the introduction of American and Canadian stoves into this country, burning the same fuel, and the interesting work published by Sir H. Hussey Vivian, of his tour in North America and the States, in which he warmly advocates the mode of heating houses in those parts of the New World, have all contributed to foster the movement; but we repeat we have mainly to thank the Fog and Smoke Committee for leading public opinion on the question. We must now, however, inquire into the effects of anthracite coal in relation to existing grates. Short as the time has been since public interest has been evinced in it, it has been proved to demonstration that it will burn well and readily in almost any close stove now made, and its cleanliness and economy is beyond question, As regards open grates and kitchen ranges, there

are many to which it is applicable; and we had a practical illustration of this at the late exhibition of domestic labour-saving appliances at the Agricultural Hall, when, amongst others, the kitchen ranges of Messrs. Brown and Green of Luton and Bishopsgate Street, were fed by anthracite coal supplied by the Anthracite Coal Company, Limited, 19, Spring Street, Paddington, and the amount of heat attained was remarkable, the attendant being quite enthusiastic in his praise of the coal. For our ordinary register grates, however, it may not be quite so applicable, as the best friends of anthracite will admit that it requires a quicker draught and a little more care or manipulation than bituminous coal. This will, however, be no bar to its use with those who will take a little trouble with it, and there will soon be plenty of grates in the market to which it will be applicable. We may, however, mention that Messrs. Smith and Stevens of Leicester Square, have already a new grate especially adapted for its use; Messrs. Steel and Garland of the Holborn Viaduct, have several in which it burns well; Messrs. Benham and Sons, Wigmore Street, show good examples for its use; Messrs. Barnards, Bishop and Barnards of Queen Victoria Street, can use it to advantage; and the Abbotsford grates of the Derwent Iron Foundry, utilise it equally as well as ordinary coal. The slow combustion stoves of the Coalbrookdale Company, fitted with drawn-down blinds or blowers, can do as they please with it, and there is little doubt that if the public will interest themselves in the movement, but little risk of ultimate success will occur. The anthracite coal-owners have formed themselves into a separate trading company for its general supply, and can deliver it in London at 24s. per ton. And considering that about two tons of anthracite is equal to three tons of ordinary coal, as regards its lasting and heat-giving qualities, leaving all its other favourable points in abeyance, it is clearly about one-third more economical in use. Neither need its more general adoption excite any alarm in the minds of its friends as regards a diminution of the supply, as it is calculated there are about four thousand million tons of it in the Welsh coal field. With a coal nearly all carbon and very strong, no smoke, only a trace of sulphur, and scarcely any ash, chimneys will scarcely ever require sweeping; and it is difficult not to believe that anthracite coal has at length a brilliant future before it.

SMALL v. LARGE SEWERS.

By ISAAC SHONE, C.E. and M.E.F.G.S.

THE paragraph in the issue of the SANITARY RECORD for April, headed as above, attracted my attention, and I resolved to write to Mr. Ernest Turner, F.R.I.B.A., the gentleman who has been endeavouring for some time past, as I understand the case, to prevail upon the Wandsworth District Board of Works to approve respectively of a 12-inch and 18-inch stoneware pipe, in lieu of a 3 feet 6 inch egg-shaped brick sewer.

Knowing that the capacities of pipe sewers to discharge sewage or rain-water vary as the square roots of the fifth power of their diameters ($\sqrt{d^5}$), and that consequently one 18-inch pipe will discharge about 2.756 times the quantity that a 12-inch pipe will discharge, and that it will discharge 1.747 times as much as a 15-inch pipe, and that a circular sewer equal in area to the egg-shaped sewer, prescribed by the Wandsworth District Board of Works, will discharge about 13.5 times as much as a 12-inch pipe, I felt curious to know the particulars of Mr. Ernest Turner's data for opposing, as it turns out, the rule of thumb dictum of the Wandsworth District Board of Works.

Thanks to the courtesy of Mr. Ernest Turner, who, as a Sanitary Architect, ought to be in great demand in these days, when sanitary house and town sewerage and drainage are beginning to be understood, I am enabled to lay before the readers of the SANITARY RECORD all the information necessary for them to be made acquainted with, to judge the case fairly. Besides the published plan and section, Mr. Turner has been good enough to furnish me with the following particulars: (1) The sewer is intended to be made large enough to receive both sewage and rainfall; (2) that the area of the surface which would contribute rain-water to the sewer consists of (*a*) 51,600 square feet of roofs and hard surfaces, and of (*b*) 64,400 square feet of roads (gravel) and gardens; (3) that sixty houses, altogether, would be accommodated, thirty on each side of the gravel roadway; (4) that the number of residents in each house, on the average, would be about seven; and (5) the sewage discharges would be equal to about twenty gallons per head per day.

Now, I respectfully submit this, that, with the foregoing data before him, it ought not to be a difficult matter for the Engineer or Surveyor acting for the Wandsworth District Board of Works to advise his employers what to do, in the face of Mr. Turner's remonstrances. The plan and section clearly shew a *simple case*, about which there ought not to be the slightest difference of opinion between two engineers competent to advise the Wandsworth District Board of Works. The pipe or sewer that shall be sufficiently capacious to remove the maximum rainfall and sewage combined, in the mean time, will be equally suitable in perpetuity; for the rainfall area to be drained will remain constant, and the population, on the whole, will not be much greater or less than it is calculated to be now, after thirty or fifty years have elapsed—and, if so, the question naturally suggests itself, what size pipe will suffice?

Let us investigate the matter impartially, but with approximate correctness, by making liberal calculations, with a view to err, if at all, on the safe side. We will deal, firstly, with the rainfall. On the surfaces (*a*) we will assume .5 in. of rainfall, and on the surfaces (*b*) we will assume .1 in. of rainfall per hour. Secondly, we will assume the sewage discharges to be equal to three cubic feet (eighteen and three-quarter gallons) per head per day, and, thirdly, that one-third of the rainfall will find its way into the sewers, when the latter are charged with the maximum flow of sewage, running from a population of (60 × 7) 420. We will further assume that the one-half of the total volume, due to rainfall and sewage in combination, will go down the pipe graded at one in seventy-six, and that the other half will pass down the pipe graded at one in eighty-seven, as per section. Then the

Rainfall will be for (*a*)	51,600 × .5 in. =	25,800
„ (*b*)	64,400 × .1 in. =	6,440
Total rainfall area	116,000	32,240 = sq.

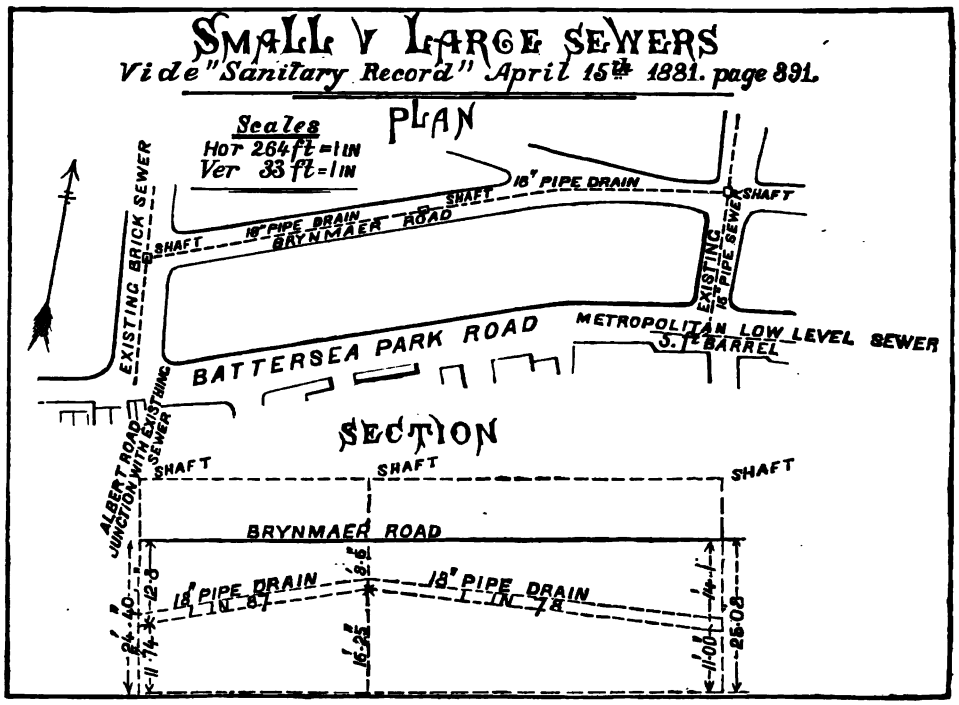
feet for one inch in depth of rainfall, and $\frac{32240}{116000}$ = .278 in. as the average fall of rain, for both surfaces, per hour. If we divide this again by three, we shall get at the maximum rainfall per hour which the sewers must be capable of receiving and passing away $\therefore \frac{.278}{3}$ = .093 in., and, as according to Mr.

Baldwin Latham's rendering (see his excellent work on *Sanitary Engineering*, page 52) the London sewers are only calculated to receive .01 in. of rain per hour, and in this the subsoil water is included, no one is likely, I think, to complain of the depth, .093 in. of rain, as being insufficient under the circumstances.

The quantity of rainfall, we will find out thus:— $\frac{32240}{12} = 2687$ cubic ft. per hour, and $\frac{2687}{60} = 44.78$ cubic ft. per minute; and by assuming that only the one-third of this latter reaches the sewers as it falls, we should provide for $\left(\frac{44.78}{3}\right)$ 14.93 cubic ft. per minute as the maximum rainfall, which, be it observed, is more than nine times the quantity the London sewers are said to be capable of removing!

the liquid which such a pipe is capable of discharging at what is called a 'self-cleansing velocity', what, I ask, but stagnation and decomposition can take place (during the major portion of the year) when the *sewage alone*—which, at its maximum even, is only about the one-tenth of the fifty-one gallons per minute—is passing into the pipe? As well expect the *Great Eastern* steam-ship to float, and pass its mighty load, along the Suez Canal, when the latter has little or no water in it, as expect an eighteen-inch pipe to become a *sanitary* sewage-carrier under such conditions as those described above!

It is to this utter disregard for natural laws (which it is the duty of the engineer to overcome or obey as the case may be) on the part of Sanitary Authorities, that I attribute the past and present unsatisfactory



The quantity of sewage to be dealt with will work out as follows:— $\frac{420 \times 3}{400 \times 2} = 1.575$ cubic ft. per minute, *i.e.*, as per my *Sewerage Tables*.* The totals are—

	cubic ft.
First, for rainfall	14.93
Second, for sewage	1.575
Rainfall and sewage =	16.505,

and this divided equally between the two eighteen-inch sewers, graded respectively at one in seventy-six and one in eighty-seven (*vide* section), will yield about fifty-one gallons per minute to each! Just enough to produce a self-cleansing velocity of three feet per second in a three-inch pipe, running full bore! But an eighteen-inch pipe, which is the size fixed upon, apparently, would discharge 88.33 times the quantity that would be necessary to make the three-inch pipe a self-cleansing one! If, therefore, the maximum volume of sewage and rainfall combined, passing into the eighteen-inch sewer-pipe, is only the 1-88.33 part of the quantity of

condition of things with regard to sewerage and drainage. A pig is just as likely to fly as sewage is to flow away harmlessly from our houses and towns, under such conditions as are imposed by the Wandsworth District Board of Works! If architects had specified in the past five-inch pipes for house-drains, and sanitary engineers had specified seven-inch pipes for such street sewers as have been the subject of this letter, a vast improvement in the sanitary condition of the country generally would have been the result.

Surely, in the face of the data supplied by Mr. Ernest Turner, the Local Government Board, or some other Authority, will go to his rescue, and assist him and others in their efforts to prevent the institution of more house and street-sewers in the Metropolis and elsewhere upon any other than scientific and sanitary principles.

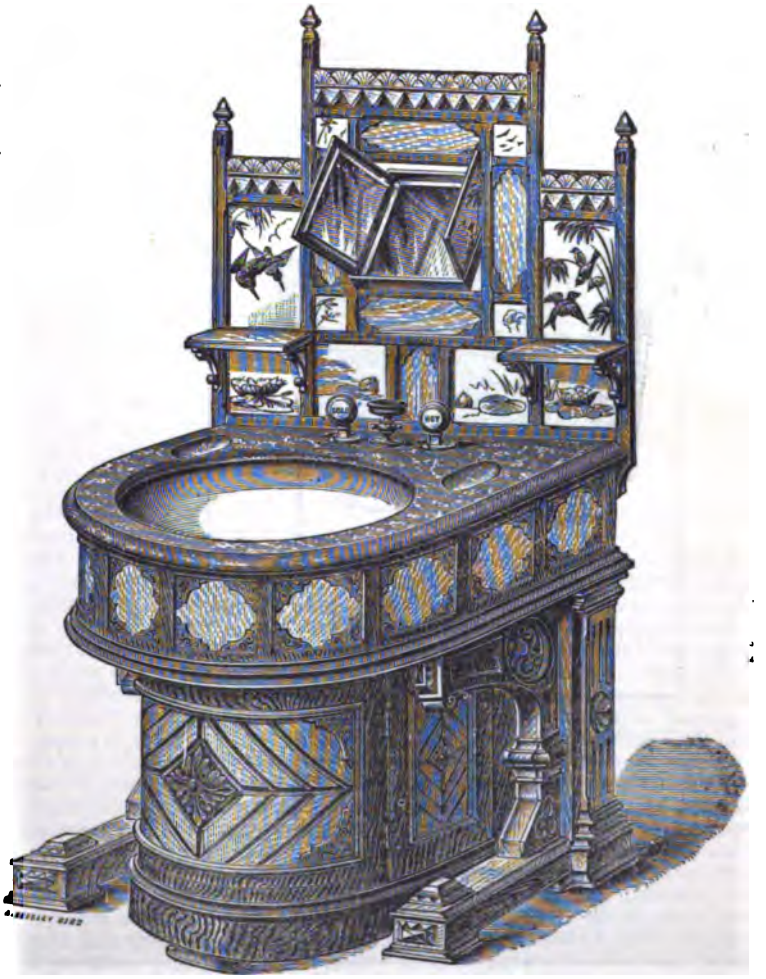
* Published by Messrs. E. and F. N. Spon, Charing Cross, London. Price 2s. 6d.

A Decree has been passed at a Congregation held in Oxford by which the delegates are permitted to have a general sanitary inspection of lodging-houses.

LAVATORIES AND OTHER APPLIANCES IN CONNECTION WITH WATER-SUPPLY.

NUMEROUS inventions are constantly appearing in connection with this important matter, and amongst the most successful firms of sanitary engineers who have kept pace with all modern improvements is the old-established house of John Fell and Co., Wolverhampton and Newcastle-upon-Tyne, who have also an agency at No. 9, Fenchurch Street, City, under the management of Mr. Sidney Napper. The constant increase in the application of hot-water apparatus to general domestic requirements, the ever increasing desire to economise time and labour in the household, is gradually producing a complete innovation in some of the arrangements of the bed-chamber and dressing-room. The system of fixed wash-stands or lavatories, with hot and cold water always at command, that has long been the favourite arrangement of the Americans, but which, until recently, we have all but ignored, now promises to take the place of the movable wash-stand with its independent basins and ewers.

Messrs. Fell and Co. appear determined to stand in the front rank of those makers who have entered upon this trade, and their catalogue of artistic wood work for baths, lavatories, etc., contains a variety of designs, from the simple one in iron or slate, for domestic offices, to the luxuriously mounted appendage for the most costly furnished chamber. At the Sydney Exhibition Messrs. Fell and Co. were exhibitors of this class of goods, as well as general sanitary articles, and obtained the highest awards. At the one now nearly brought to a close at Melbourne they manufactured expressly a most magnificent bath, mounted in pollard oak, elaborately carved; and the accompanying engraving represents one of their 'anti-splash' tip-up lavatories, forming another item in their display at the Australasian colony. This piece of furniture is probably one of the most elaborate single basin lavatories yet made. The main portion of the woodwork is pollard oak, inlaid with light oak, the back being inlaid with hand-painted tiles of the highest artistic character. In the centre is a mirror which unfolds at each side and is hinged in the middle, and so arranged that all sides of the face can be seen, the outside being painted, and forming a continuance of the subject delineated on the tiles. The basin, which is a patent, is of porcelain enamelled iron, the valves having a concealed supply, and being self-closing; the mountings are nickel-plated, and the slab is a fine specimen of St. Anne's marble.

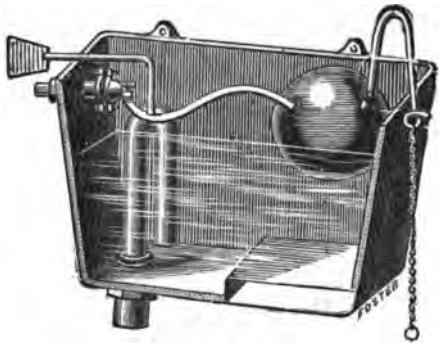


Turning to a more humble specimen of the craft of the sanitary engineer, but one on which depends to a great extent the freedom from danger of overflow, and it may be, even explosion, we desire to call attention to Jefferies' patent ball valve, which we also illustrate. Every reader of this Journal is fully aware of the value of a reliable ball tap, and it is very doubtful if any preceding invention of its kind has met with greater success. These valves are of several patterns, differing slightly in the arrangement for the flow of water. The one we have selected for illustration is that adopted by the Edinburgh and District Water Company, and which appears to us to guard against contingencies that sometimes occur. It will be seen that a tap is here provided, so that the supply from the main can at any moment be shut off. This at times may be found very useful, as for instance, in repairs to cistern, cleaning out, etc., without the necessity of meddling with the action of the valve itself. Its working arrangements will be easily understood. When the ball falls, it tilts or cants the valve, and as it rises it gradually closes, the valve resting on an india-rubber seating; a great leverage is brought into action both by the lever and spindle, and although extremely simple this is claimed to be the most powerful ball valve yet invented.

Closely allied in character to the preceding is Cooper's patent syphonic flush and water-waste preventer, simple in construction, almost impossible to get out of order, and securing a perfect flush with a

JEFFERIES' PATENT BALL VALVE.

smaller quantity of water. On reference to the engraving it will be seen that attached to the ball is an arched rod connected with the chain, and at the opposite end of the cistern a balance weight of iron. On pulling the chain the ball is drawn down, displacing a sufficient body of water to cover the top of the syphon, which is immediately set in action, and if



the hold on the handle or chain is released at once it must, notwithstanding, entirely empty the cistern, at the same time opening the tap, through which flows a fresh supply of water. As nothing is left to chance in this invention, and no valve at bottom of cistern is employed, we have heard it spoken of in terms of high praise by several practical plumbers. On a future occasion we may revert to Messrs. Fell and Co.'s productions.

THE PUBLIC HEALTH ACT.—Mr. Benjamin Davies, M.D. Univ. Edin., F.R.C.S. Eng., has been re-appointed Medical Officer of Health, and Mr. Henry Williams, Inspector of Nuisances, for the Newport (Mon.) Urban and Port Sanitary Districts, at £150 and £78 per annum respectively, both for five years for the Urban, and one year for the Port District; Mr. A. Whitham, L.R.C.P. Edin., L.R.C.S. Edin., has been appointed Medical Officer of Health for the Adlington Urban Sanitary District, Lancashire, *vice* Tobin, whose appointment has expired; Mr. William Howland has been appointed Inspector of Nuisances for the Thame Rural Sanitary District, Oxfordshire, at £100 for one year, *vice* Young, resigned; Mr. Henry James has been appointed Treasurer to the Stourbridge Guardians and Rural Sanitary Authority, *vice* Thomas, resigned; Mr. Frederick W. M. Gardiner has been appointed Treasurer to the Ormskirk Guardians and Rural Sanitary Authority, *vice* Palmer, resigned.

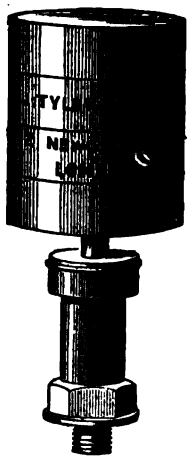
BOILER EXPLOSIONS AND THE FREEZING OF WATER PIPES.

(*Continued from page* 375.)

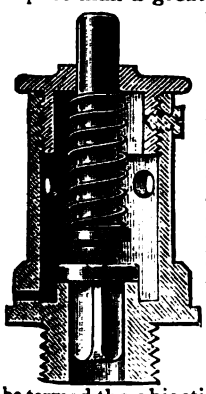
ALTHOUGH this is not the time of year for freezing of water pipes to occur, boiler explosions, unfortuately, know no season, and may happen at any moment. We, therefore, resume a subject that is daily becoming of more importance from the increased use of hot-water apparatus for bath-rooms, and other domestic purposes. During the summer months, when fires and hot water are not so much in demand, and when families are taking their usual trips to the country or seaside, a favourable opportunity offers for looking into the conditions of the hot-water apparatus; and following up our remarks in the last number of the SANITARY RECORD on safety-valves, we purpose alluding to one or two others that have been brought to our notice, and shall then close this part of the subject. Into the relative merits of dead weight safety-valves, as against those that act independently of them, we do not intend to enter. Each have their partisans, and each are equally valuable under given conditions. The dead weight certainly has this advantage—that if an increased pressure is necessary, safety can be provided for by placing on an additional weight, without any alteration of the valve itself, though for the small kitchen boiler this is not so much needed as in larger apparatus. Notwithstanding this, 'The Improved Dead Weight Safety-Valve' of Messrs. J. Tylor and Sons, Newgate Street, is a very complete little article, useful alike for a small or large boiler, being capable, when fully weighted, of counterbalancing 120 feet pressure, each weight (of which there are four) being adjusted to the requirements of 30 feet. It is not dependant upon any lever or hinged joint, and these points of friction being dispensed with, it is not liable to set fast. Emanating from so noted a firm, and being London made, it may be confidently relied upon for quality and finish, and has the advantage of being very moderate in price.

Another simple valve of the unweighted class is that made by Mr. John Mills, Kirkstall Road, Leeds, a manufacturer well known in the Northern counties for all kinds of engineers' and boiler-makers' fittings. It is an ordinary spring valve, the spring being made of carefully-selected steel wire, and nickel-plated, to prevent corrosion. There is no India-rubber or other stuffing to require replacing. The valve is ground to its seating, and cannot be tampered with by ignorant persons. It is set to the pressure ordered when sent out, and, we understand, is in

use largely in the North and Midland counties; the maker claims that this valve is equal to anything in



the market in point of quality and safety, and lower in price than a great many. The last valve we shall



mention in this article is that of Messrs. Fell and Co., Wolverhampton, and 9, Fenchurch Street. Like Mr. Mills's valve, and others mentioned in our last number, it is of the spring class, and automatic in its action, and appears to possess all the advantages of those we have described as made on a similar plan. Our attention has, however, been more directly called to it on account of its extreme lowness in price, which is less than any other we have seen. Messrs. Fell and Co. are not cheap makers, in what may be termed the objectionable sense, and by introducing the valve in question, from its low cost, they remove any excuse from any hot-water fitter neglecting to fix one of them to every boiler he is fitting up.

(*To be continued.*)

Some facts have been published as to the result of the census in some of the towns of the south-west of England. Plymouth has grown from 68,080 in 1871 to 73,400. In Devonport and Stonehouse there will be found to be a slight decrease, owing chiefly to the withdrawal of soldiers from the garrison. Dawlish has increased to 4,493, or 253 more than in 1871; Launceston has an increase of 246; Liskeard shows a decrease of 647; South Molton a decrease of 661; Truro a decrease of 546.

EXAMINATION OF FOOD IN ST. PANCRAS.—Dr. Thomas Stevenson, Public Analyst for St. Pancras, in his report for the past quarter, states that he has made the following analyses, with the results stated: Butter, 16 samples, 14 of which were found to be genuine and 2 adulterated. Vinegar, 8 samples, 3 genuine and 5 adulterated. Flour, 3 samples, 2 genuine and 1 adulterated. Milk, 11 samples, 10 genuine and 1 adulterated. Five samples of pepper, 1 of gin, and 1 of mustard, were all found to be genuine.

THE
SANITARY RECORD.
MAY 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

DR. B. W. RICHARDSON ON SMALL-POX HOSPITALS.

AT the last meeting of the Sanitary Institute Dr. Richardson read a paper entitled 'Suggestions for the Management of Cases of Small-pox and other Infectious Diseases in the Metropolis and Large Towns'. Crude in statement, ludicrously erroneous in point of fact, this paper, in ordinary circumstances, would have neither required nor deserved any notice. But at the present time, when small-pox is more widely spread than it has been for many years, when our small-pox hospitals are all full, and cases are being rejected in large numbers daily, its effect may be so disquieting, and what is worse, so mischievous, that we cannot allow ourselves to treat it on its demerits and pass it by unnoticed.

The first thing which strikes us in looking over the address in question is its want of originality. As regards small-pox and small-pox hospitals at least, it contains nothing scientific, nothing original, and nothing practical. It is simply an echo of the prejudices of the mob. But to be more particular. *Inter alia* it is asserted that the aggregation of patients in large hospitals is subversive of rational treatment; that by reason of the aggregation the atmosphere of the hospital building is poisoned, and the patients consequently deprived of what is essential to their recovery, abundance of pure air; that owing to their number it is impossible to provide a sufficient number of nurses and doctors, two of the former and one of the latter being required for each small-pox patient; that as a consequence of this the patients are necessarily neglected, and therefore die in these hospitals in much greater proportion than they do when they are treated at home. It is further asserted that the dead and the dying, of which there must be a large number in these large small-pox hospitals, materially interfere with the comfort of those who are recovering, and lastly, that the 'troops of visitors' who resort to these hospitals, and whom it is impossible on grounds of humanity to keep out by any kind of regulations, spread the disease in a truly incalculable manner—all which truly mischievous results would be avoided by small hospitals, of say thirty to forty beds. Patients would not be 'aggregated', no visitor would be allowed (!), air would not be poisoned, a sufficient number of nurses would be readily obtained, patients would be more care-

fully *tended*, and, as a result of all this improved treatment, the mortality would be very much less, a result which is now said to be a fact, established by the very low mortality of small-pox patients treated in their own homes. The fundamental misconception underlying all this loose popular talk about our large infectious hospitals is somewhat as follows. It is apparently assumed that in these hospitals people are massed together, without regard to age or sex, under one roof; that with closed doors and windows the dead, the dying, and the convalescent are packed together only less closely than herrings in a barrel; that as the result of this, a veritable defilement and pollution of the atmosphere is produced, which spreads death and desolation throughout the neighbourhood in which it is placed; and, strange as it may appear, to this huge life-destroying pest-house 'troops of visitors' betake themselves every day, inhaling the poison themselves, and spreading it broadcast wherever they go. All this, however, is the baseless fabric of a dream. In London, and indeed in this country, no such hospital exists, nor indeed any hospital which in any, even the smallest degree, comes near it.

With the view of refreshing our minds on the subject of these large small-pox hospitals, on the 23rd ult., we visited the Deptford Small-pox Hospital. This hospital is situated in the Old Kent Road, separated from the densely populated part of Camberwell on the west by two lines of railway, is bounded on the north by market gardens, on the south by the Old Kent Road, and on the east partly by market gardens, partly by open space, and partly by new streets of houses, all built *since* the hospital was opened, showing that at least some people are quite at their ease as regards the proximity of small-pox hospitals.

At the time of our visit it contained 400 patients under one Medical Officer in chief, Dr. McCombie, but not under one roof, not in one building, but in fifteen perfectly distinct and separate buildings, forming, as a matter of fact, *fifteen* separate *hospitals* with nurses, assistant nurses, ward-servants, bath-rooms, closets, and ward-kitchens, entirely pertinent to each other, just as if each building had belonged to different bodies of management. We visited each of the fifteen, and saw, individually, each of the 202 patients whom we found in bed, and in the aggregate the 198 whom we found recruiting their strength in the open grounds of the *hospitals*. During the visit we jotted down a few notes, which, for the information of our readers, and in order that they may form a judgment founded on fact, we shall briefly transcribe here.

Pavilion No. 16.—26 beds; empty; dormitory for convalescents who are in the grounds all day.

Pavilion No. 15.—10 beds; empty; dormitory for convalescents.

Pavilion No. 14.—10 beds; empty; dormitory for convalescents. No visitors in either of these pavilions.

Pavilion No. 13.—Children's ward; 25 beds; 21 patients in bed; 5 severe cases. No visitors.

Pavilion No. 12.—23 patients; 20 in bed; 4 severe cases, one of which is dying. No visitors.

Pavilion No. 11.—Divided into a convalescent day-room and sleeping-room; 77 patients (female) under the care of a nurse, who looks after them in airing-courts and in the ward. No visitors.

Pavilion No. 10.—28 patients; 24 in bed; 4 severe cases. One visitor.

Pavilion No. 9.—25 patients; 23 in bed; 3 severe cases, one slightly delirious. No visitors.

Pavilion No. 8.—26 patients; 24 in bed; 4 severe cases, one probably dying. One visitor.

Pavilion No. 17.—Male convalescent sleeping-room. At time of visit empty.

Pavilion No. 18.—Same as last. No visitors in either.

Pavilion No. 6.—23 patients; all in bed; one severe case. No visitors.

Pavilion No. 5.—23 patients; 18 in bed; no severe case. No visitors.

Pavilion No. 4.—24 patients; 20 in bed; one severe case. No visitors.

Pavilion No. 3.—Male convalescent day and sleeping-room; 86 patients. Under the charge of a male attendant who looks after them in the grounds and in the ward. No visitors.

Pavilion No. 2.—20 patients; 17 in bed; 3 severe cases. No visitors.

Pavilion No. 1.—24 patients; 22 in bed; 3 severe cases. One visitor.

Of the whole number of patients, 198 spent their time in the hospital grounds daily; they were, as regards bodily health, well, and were detained, not because they themselves were ill, but because they might infect their neighbours by reason of infection adhering to their bodies; 318 were on a meat diet, seven on a fish diet,—*i.e.*, altogether 325 had recovered from the acute stage of the disease, and therefore in small need of medical care and nursing—requiring simply to have their food set before them. This leaves 75 of the whole 400 actually in various degrees sick, distributed through ten different buildings, and of these 75, 28, distributed through these same buildings, were cases requiring constant and careful nursing, which we saw was amply provided for.

Dr. Richardson's statement that two nurses and a doctor were required for each case is almost too ludicrous to be noticed, as well as his suggestions to place the small-pox patients on the roofs of the houses. It is only the small proportion of cases, say, in round numbers, 25 per cent. of the whole, in which there is any question of nursing, and, as regards a physician, he might be dispensed with, at least in the all-important sense intended by Dr. Richardson. It requires no physician to administer nourishment, or to keep the body of a small-pox patient clean, and what more than this is to be done for the majority of the small-pox sick we cannot imagine.

But to return to the Deptford Hospital. Here are 400 people treated under one administration, not as Dr. Richardson implies massed under one roof, but distributed in fifteen distinct and separate buildings, containing about 26 patients each, males duly separated from females, and children from both. No opportunity here of people seeing what they should not see—a statement by the way which Dr. Richardson ought to explain—but all duly and properly classified, with nurses in sufficient number to look after them. In the various buildings no bad odour was perceptible, but, on the contrary, abundance

of fresh air and open windows, the allowance to each acute patient being 2000 cubic feet of space, clean beds and floors, and of the dead and the dying which Dr. Richardson suggested were such trouble to the living recovering, we found—how many?—no dead, and but one man quietly dying, wholly unnoticed by those in the beds about him. The 'troops of visitors' which, according to Dr. Richardson, we should have expected to find, are wholly absent, as anybody who knows anything of small-pox would have predicted. Of all our infectious diseases small-pox is the one which visitors avoid. The disfigurement of the disease is so hideous that people almost invariably shun it. Only a few of the nearest relations care to visit a small-pox hospital, and then only in cases of dangerous illness. Thus at the time of our visit we found but three visitors, in a hospital of 400 patients, and that between 3 p.m. and 4 p.m., the time at which visiting is most common, and Dr. McCombie informed us that the daily average of visitors during the week ending April 23rd, was eleven. At the Small-pox Hospital, Highgate, where we had the good fortune to meet Dr. Munk, we found no visitors at all, and learned that these were admitted on two days of the week, and that as a rule there were about seven visitors on each day, giving an average of about two a day to about 100 patients. At Stockwell, Homerton, and Fulham, we learned that the visitors were in somewhat the same proportion. Now these are all the large small-pox hospitals in London that we know of, and the statement 'troops of visitors' and *fact* do not agree. Some visiting there must be, this all are agreed on, and as matter of fact we find that it is not more than, or possibly even so great as, it should be.

There are two more special points which deserve notice, the influence of the dying on the recovering, and, as is alleged, the high mortality of these hospitals. It is alleged or supposed that in these large hospitals the number of the dying at any one time must be great; indeed it is suggested that nearly all the patients die. How far this is consistent with fact we need not say. Deptford and Highgate speak for themselves. In the former, of 400 patients there was one dying, in the latter not even one. It seems to be forgotten that of small-pox, as it is seen in large hospitals, only a very small proportion of the cases die, not more than 20 at the most in every 100, further, that the bulk of them, or say two-thirds, die in the night between 10 p.m. and 6 a.m., and so at a time when patients not very bad would be asleep; that as convalescents are 'in these hospitals' kept separate from the acute cases, the former would never come in contact with dying cases at all. There would remain to be injuriously affected from this cause, excluding the convalescents who would not witness this, and the dying and the unconcious who could not witness it, a fraction of those who were recovering and still in the acute ward, who would occasionally be cognisant that a fellow creature was dying, and occasionally witness the removal of the body. But this, by arousing in them a clearer consciousness of their own more fortunate condition, although not unaccompanied by some sympathetic pain, would probably be on the whole pleasurable.

'Suave mari magno turbantibus æquora ventis,
E terra magnum alterius spectare laborem;
Non quia vexari quemquamst jucunda voluptas
Sed quibus ipse malis careas quia cernere suave est.'

As regards the mortality it is necessarily large in the hospitals as compared with the cases treated at home, *because* for the most part the bad cases are sent to the former, whereas, generally, the mild cases are treated at the latter.

CLERGYMEN AS SANITARIANS.

AT the recent Sanitary Council at St. Paul, Minnesota, held under the auspices of the State Board of Health, the question, how far clergymen should co-operate with physicians, was fully discussed by Bishop Ireland, Rev. Dr. Burt, and other clergymen, as to the practical work which clergymen can do toward the promotion of hygiene. Bishop Ireland suggested that clergymen would do well to explain to their flocks the importance of the rules of hygiene and their duty to study and observe them. They should see that the rules of hygiene are duly observed within buildings under their own control, churches and school houses. In their visits to their parishioners, especially the poor, they ought to call their attention to this subject of hygiene and notice whatever defects may be observable in and around their dwellings. They should be first among those who labour by the formation of boards of health and other sanitary organisations to improve the public health.

There can be no doubt of the great and valuable influence which the clergy can, and we must in fairness say do, exercise as sanitarians in promoting the health and advancing the physical welfare of their flock. The name of Charles Kingsley stands in the front of sanitarians in this country, and he was one of which the church in England has furnished hundreds of hardly less valuable, if less known, examples. But it is equally certain that the clergy have the power to exert a yet more extended, active, and beneficial influence than they at present do, by taking a practical part in the sanitary movements of the day, and assisting some of the various agencies set on foot for the advancement of the national health, of which many habitually appeal to them without often receiving any countenance or aid such as they might perhaps not unreasonably expect. Thus the National Health Association, 44, Berners Street, London, W., has, at the instance of its chairman, Mr. Ernest Hart, prepared for distribution through district visitors, mission women, visiting ladies, and at mothers' meetings, a great variety of very cheap tracts, leaflets, almanacs, etc., on health subjects, fresh air, ventilation, management of infants, and prevention of disease; it has

also arranged to furnish the services of a staff of lecturers at mother's meetings, etc., local clubs, or school-rooms. But the number of metropolitan clergymen who avail themselves of this, and a great number of other most valuable aids to social and physical progress which the National Health Association furnishes, is very small indeed. A circular was recently addressed to a great number of the clergy on the subject, and we sincerely hope that the number of the clerical supporters of the sanitary movement will largely increase, and that the National Health Association will find the clergy not less earnest in promoting cleanly, healthful lives and habits among the poor than the laity, and find some of its most earnest supporters amongst the clerical body.

NOTES OF THE MONTH.

CREMATION IN NEW YORK.

A cremation society has been organised in New York, of which the Rev. J. D. Bengliss has been elected president. Among its rules are, that one-half the fees received from active members, and all the dues from associated members, are to be devoted to an 'incineration fund', the purpose of which is to provide facilities for carrying into operation the cremation of deceased members of the society. This is not to include the cost of conveyance of the body to the crematory, but 'only the cremation of the body and the return of the ashes' to the friends or relatives. All active members who may have paid in ten dollars to the treasury of the society during life, and who may be 'in good standing' at the time of death, will be entitled to this privilege. The annual subscription of active members is to be three dollars, with an entrance fee of the same amount.

A HEALTHY DEPENDENCY.

United States Consul H. J. Crouch, reporting on the health of St. Helena, observes that during the previous week the only death reported was that of a Spanish sailor, who died of 'Java Fever'; no deaths in the city of Jamestown, which has a population of 6240. The streets are cleaned and swept daily, and the excellent sanitary condition, with the favourable climate, renders this one of the most salubrious places in the world.

TYPHOID FEVER IN GERMANY.

Dr. Dudley P. Allen, writing from Leipsic says: 'Typhoid Fever, which was previously very prevalent in Germany, has greatly decreased in many cities. This decrease is largely due no doubt to the improved water-supply, which, however, many cities have been very slow to introduce, Leipsic, for instance, having had a public water-supply for only fifteen years and Dresden but ten years. The wells from which water for drinking and cooking was formerly taken are still in existence, and are to be seen in the streets and courts of houses, where they are most admirably arranged to catch all sewage. Whether the arrangement of water-closets has anything to do with the cases of typhoid-fever or kindred diseases that occur at present is perhaps difficult to say. If, however, the foul gases to which they give rise can cause sickness, it might certainly be expected. Living, as families almost universally do, in flats, each flat is supplied with one or two water-closets. Very commonly these are ventilated into the corridor leading up through the centre of the block, and during the winter, when the street-doors are closed, the stench in the corridors of many houses is almost unbearable.

A PALACE FOR THE CHILDREN OF NEW YORK.

Mr. A. B. Stone of New York, has just purchased for twenty thousand dollars a handsome site at Bath, Long Island, called Bath Park, for the Children's Aid Society. It contains four-and-a-quarter acres, with trees, pavilions, bath-houses, and many conveniences for a sanitorium, and has a frontage of about 450 feet on the sea, at a point where the bathing is peculiarly safe. The new summer home will be the resort of the poor children of the tenement houses during the hot weather.

THE TRUTH ABOUT VACCINATION.

In view of the extreme state of anxiety which now prevails in the metropolis with regard to the alarming spread of small-pox, and in view, also, of the difficulties experienced, through the Hampstead Hospital decision, in securing the isolation of the sufferers, the National Health Society must be held to have performed a great public service in drawing up and circulating a pamphlet, giving, in a plain and concise form, the real facts as to the value of vaccination as a protection against the now raging epidemic. The pamphlet, which this always practical and useful Society has prepared, has been so much approved by the Local Government Board that they have had it revised by their own officials, so that it may now be regarded as an official publication on the subject of which it treats. The Whitehall Board have further assented to the distribution of the pamphlet, from house to house, in the Poplar Union, by officers specially appointed by the Local Guardians for this purpose, and have sanctioned the payment, out of the Metropolitan Common Poor Fund, of the expenses incidental to this distribution. It would certainly be an advantage if the truth about vaccination could be brought home to the half-educated, self-sufficient classes of persons who are so easily swayed by noisy clamour about the liberty of the subject to neglect the vaccination of their children, and so render them fit subjects for an attack of small-pox. It must be difficult, indeed, for any unbiassed person to rise from a perusal of the National Health Society's pamphlet without being disabused of any lingering prejudices against vaccination. All the statements in it have received the official approval of the Local Government Board, so that there can be no possible doubt as to their authenticity. The pamphlet commences with a description of the extreme fatality of small-pox in its natural state, shows the groundlessness of the alleged injuries from vaccination, and of the alleged inoculation of a foul disease, contrasts the small-pox mortality in bygone generations with the mortality since vaccination became general and since it became compulsory, proves that the liability to attack, and the severity of attack, is in direct inverse proportion to the thoroughness of the vaccination, and insists upon the importance of every child being vaccinated thoroughly and being re-vaccinated at the age of puberty. The pamphlet is throughout couched in simple yet striking language, and its publication and

circulation ought to do much good to encourage vaccination amongst the classes who now so greatly neglect it.

MILK EPIDEMIC AT ABERDEEN.

A very remarkable and novel epidemic, occurring at Aberdeen, and due to the drinking of milk supplied by a particular dairy, has just been investigated, on behalf of the Scotch Board of Supervision, by Mr. Andrew Rutherford and Dr. Littlejohn. There seems to be no doubt of the connection of the milk-supply with the outbreak, since no less than 90 out of the 110 families supplied from the implicated dairy were invaded, whilst no cases of the disease were found in any family that did not receive its milk from this dairy. Over three hundred persons were attacked, without the slightest warning, in the course of a short time; and, as soon as the supply of milk was stopped, the spread of disease stopped as suddenly as it began. The water-supply of the farm was unsatisfactory, for all the water for the cows came from a large and practically uncovered cistern, which was placed in the byre where thirty cows were kept; and this water was found, on analysis, to be bad. So far the epidemic presents no point of difference from the numerous epidemics of infectious disease (now more than seventy in number) that have, during the last ten years, been proved to be due to infected milk. But the symptoms of the disease are altogether novel and inexplicable. The sufferers were attacked with severe rigors, which lasted several hours, or even for a day; this was followed by marked febrile symptoms. The tonsils were slightly enlarged, but there was no false membrane; and a marked feature was the swelling of the lymphatic glands of the neck and those above the clavicle. The prostration was extreme. The febrile symptoms passed off in a few days; but, in a great many cases, there was a sudden relapse, and the relapse was often more severe than the primary attack. Sometimes three or four relapses occurred, and the patients were in all cases left extremely weak. The symptoms are not those of any known disorder; and it would seem, therefore, that we are in presence of a new disease, and, consequently, of a new danger to our milk supplies. It is reported that a specimen of the milk that was preserved contained organisms that seem to be entirely new to science; and, looking to the remarkable results that are following the researches now being made into the properties and capabilities of bacterial bodies, it is of the highest importance that experiments should be made with the view of ascertaining whether the organisms discovered in the milk are connected with the disease in the relation of cause and effect. The investigation of the epidemic on the spot does not seem to have been very skilfully done. Only one *post mortem* examination, and that an imperfect one, was made of a person dying of the disease. No organisms were found either in the blood or in any of the tissues of this case, and more indirect evidence of the causation of the disease will, therefore, have to be sought. It is to be hoped that no pains will be spared by the Commissioners of the Board of Supervision to clear up what is at present a most puzzling and inexplicable epidemic.

The churchyard of All Saints, Newcastle, is to be laid out as recreation ground, at the sole expense of Mr. Donkin, merchant and ship owner of that town.

THE PUBLIC HEALTH
DURING APRIL 1881.

The mean temperature during April, at the Royal Observatory, Greenwich, was 45°.9, and almost identical with the average April temperature in 100 years, which is 46°.0. The mean was below the average on each of the first ten days of the month; this cold period was followed by eight warm days, after which, excepting four days in the last week, the mean was again below the average. Thus, the mean showed a deficiency on 18, and an excess on 12, of the thirty days in the month. The coldest day was Sunday, 3rd, when the mean was 37°.3 and 8°.8 below the average; while the warmest day was Wednesday, 13th, when the mean was 55°.0, and showed an excess of 7°.8. Rain was measured at Greenwich on but eight of the thirty days in the month, to the aggregate amount of only 0.6 of an inch, which was 1.1 inches below the average April rainfall in 61 years. The rainfall in the first four months of this year amounted to 6.0 inches at the Royal Observatory, which was rather more than half an inch below the average amount for that period. The sun was above the horizon during 414.9 hours in April, and 126.1 hours of bright sunshine were recorded at Greenwich, which was 6.4 hours less than the amount in April 1880, but 18.8 hours in excess of the average amount in the corresponding month of the four years 1877-80. North-easterly or north winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing a population estimated (on the basis of the rate of increase between 1861 and 1871) at more than seven and a half millions of persons in the middle of this year, or nearly a third of the entire population of England and Wales, 20,632 births, and 12,907 deaths were registered during the four weeks ending 30th April. The births were equal to an annual rate of 35.3 per 1,000 of the estimated population in the twenty towns, against 36.5, 38.6, and 37.5 in the first three months of the year. The birth-rate last month was equal to 35.8 in London, and averaged 34.9 in the nineteen large provincial towns; it ranged upwards from 28.3 and 30.2 in Brighton and Bristol, to 39.2 and 39.3 in Wolverhampton and Sunderland. The results of the recent census, so far as they have been locally published, appear to show that the Registrar-General's estimates of the present population of most of the large English towns are more or less in excess of the actual figures. This is mainly due to the severe commercial depression that prevailed during the last few years of the decade, which checked the aggregation to town centres, and prevented the rates of increase that prevailed during the preceding decade, 1861-71, from being maintained. It is needless to point out that this general over-estimate of the population of these towns has caused their recent birth- and death-rates to be understated.

The annual death-rate in the twenty towns during the four weeks of April averaged 22.1 per 1,000 of the estimated population, against 26.2, 23.8, and 22.0 in the first three months of the year. The April death-rates in these towns in the three years 1878-79-80 were respectively 25.8, 25.7, and 21.9. The death-rate last month, therefore, although showing a slight excess upon the low rate in April 1880, was

very considerably lower than the April rates of either 1878 or 1879.

The lowest annual rate of mortality in the twenty towns last month was 16.3 in Leicester. The rates in the other towns, ranged in order from the lowest, were as follow:—Norwich, 18.3; Brighton, 18.9; Hull, 19.1; Bradford, 19.9; Bristol, 20.0; Portsmouth, 20.0; Birmingham, 20.4; Leeds, 20.5; Sunderland, 20.6; Salford, 21.4; Oldham, 21.5; Nottingham, 21.9; London, 22.2; Plymouth, 22.6; Sheffield, 23.1; Manchester, 23.9; Newcastle-upon-Tyne, 24.0; Wolverhampton, 25.8; and the highest rate during the four weeks was 27.0 in Liverpool. As noted above, the calculated rates in most of these towns are somewhat under-stated through an over-estimate of their present population; this is the case in Leicester, the death-rate in which town, however, after due allowance for this under-statement, has recently been satisfactorily low. In the nineteen provincial towns, which have an aggregate population very similar to that of London, the annual death-rate during April averaged 22 0 per 1,000, against 22.2 in London, where the principal zymotic diseases were nearly twice as fatal as in the provincial towns. The excess of mortality in Newcastle-upon-Tyne, Wolverhampton, and Liverpool, was to some extent due to zymotic fatality; diseases of the respiratory organs were also exceedingly fatal in Liverpool.

The 12,907 deaths from all causes in the twenty towns last month included 1,506, or nearly 12 per cent., which were referred to the principal zymotic diseases; of these, 331 resulted from whooping-cough, 313 from measles, 307 from small-pox, 233 from scarlet fever, 139 from fever (principally enteric), 119 from diarrhœa, and 64 from diphtheria. These 1,506 deaths were equal to an annual rate of 2.6 per 1,000 in the twenty towns, during the four weeks under notice, and showed a slight increase upon the declining rates in recent months. The death-rate from these diseases last month was equal to 3.3 per 1,000 in London, whereas it did not average more than 1.9 in the nineteen provincial towns; it ranged in the nineteen towns from 0.7 in Brighton and 1.0 in Leicester, to 3.0 in Newcastle-upon-Tyne and Portsmouth, and 3.1 in Wolverhampton. Scarlet-fever was again the main cause of the high zymotic death-rate in Wolverhampton, and diphtheria in Portsmouth. The 331 deaths from whooping-cough in the twenty towns were equal to an annual rate of 0.57 per 1,000, showing a slight increase upon the rates that prevailed in the two preceding months; the fatality of this disease, however, continued considerably below the average for the season, but again showed an excess in Leeds. Small-pox caused 303 more deaths in London, 2 in Liverpool, 1 in Birmingham, 1 in Oldham, and not one in any of the sixteen other large towns. The prevalence and fatality of small-pox in London showed a further considerable increase during April. The number of small-pox patients in the Metropolitan Asylum Hospitals, which had steadily increased during the five preceding months from 105 to 899, had further increased to 942 at the end of April. The increase during April, however, very inadequately represents the increased prevalence of small-pox in London, as these hospitals were practically full during the greater part of the month, and large numbers of applications for admission had to be refused. The average weekly number of new cases of small-pox admitted to these hospitals, which had steadily increased from 20 to 210 in the six preceding months, averaged 218 during the four weeks of April. The largest proportional fatality of small-pox in the metropolis again occurred in the south and east groups of registration districts. The 313 deaths from measles in the twenty towns were equal to an annual rate of 0.54, and showed a further increase upon that which prevailed in the two preceding months. No less than 244 of these deaths occurred in London, while but 69 were recorded in the nineteen provincial towns, although the disease showed considerable fatality in Sheffield and Bristol. The death-rate from scarlet-fever during April showed a slight increase upon that which prevailed in the preceding month, and was equal to 0.40 per 1,000; the largest proportional fatality occurred in Wolverhampton, where it was equal to 2.2 per 1,000. Fever, principally enteric, caused 139 deaths in the twenty towns during April, of which 59 occurred in London, and 80 in the nineteen provincial towns. The annual death-rate from this cause averages 0.24 in the twenty towns, against 0.24 and 0.22 in the two preceding months. The highest death-rate from fever last month occurred in Liverpool. The fatality of diarrhœa, mainly of infants, showed a slight decline from that recorded in recent months. The 64 deaths referred to diphtheria included 36 in London and 28 in the nineteen towns. The fatality of this disease showed a further considerable increase in Portsmouth, where it caused 11 deaths, equal to an annual rate of 1.1 per 1,000, or ten times the average rate, in the twenty towns.

The deaths of infants under one year of age in the twenty towns during April averaged 1.42 per 1,000 of the births registered. In the first three months of the year, the proportion averaged 149, 137, and 135 per 1,000 respectively. Infant mortality last month was equal to 130 per 1,000 in London, while it averaged 155 in the nineteen provincial towns, among which it ranged upwards from 110 and 118 in Brighton and Norwich, to 162 in Manchester, 170 in Liverpool, 188 in Leeds, and 203 in Bradford.

The fatality of diseases of the respiratory organs showed a further decline during April. The average weekly number of deaths referred to these diseases in London, which had been 513, 436, and 371 in the first three months of the year, further declined to 355 during April, and were 62 below the corrected average weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London during April was equal to 5.0 per 1,000, against 7.2, 6.1, and 5.2 in the three preceding months. In Liverpool and Salford, the death-rate from the same diseases last month was equal to 7.9 and 5.5 per 1,000 respectively.

In the outer ring of suburban districts around London, having a population estimated at a little less than a million persons, the annual death-rate from all causes during April was equal to 15.9 per 1,000, showing a slight increase upon that which prevailed during March. The annual death-rate from the principal zymotic diseases in suburban London was equal to 1.6 per 1,000, against 1.2 and 1.4 in February and March. The death-rate from all causes, and from the principal zymotic diseases, within registration London during last month was, as before stated, 22.2 and 3.3 respectively. There is good reason to believe, however, that the calculated rates for suburban London are somewhat understated through an over-estimate of the present population.

SPECIAL REPORTS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this society was held on Friday, April 22; Dr. BRISTOWE, President, in the chair. After the minutes had been read, Dr. VINEN reported that, by direction of the Council, he had written to the President of the Local Government Board, asking him to receive a deputation from the Society on the subject of the notification of infectious diseases, which the Society had already long since decided should be compulsory on persons in charge of the sick. He also read a letter from the President appointing Tuesday, the 26th, for receiving the deputation, at the same time as other deputations from the British Medical Association, Vestries and District Boards, Social Science Association, and the National Health Society (see page 428). A report was also brought up from the Council respecting the course for the Society to adopt in view of the present position of affairs as regards the metropolitan hospitals for infectious diseases, and on the prevention of the spread of infectious diseases by means of children attending the School Board schools, recommending that these subjects be again referred to them for further consideration. Agreed to. The report of the special committee on the disposal of house and trade refuse was presented, and ordered to be printed and circulated amongst the members.

The meeting recommended that a letter be sent to the Metropolitan Asylums Board, pointing out that convalescents do not require so much room as acute cases, and that they could be best retained in huts or double tents, placed in the country. Mr. R. W. Tuson was balloted for as an Associate, and unanimously elected. A letter was also read from Mrs. Johnson, requesting a personal interview with the Society respecting her plan of nursing cases of infectious diseases. Resolved, that the original answer be adhered to. Mr. Hugh Herbert Mason, Medical Officer of Health for East Ham, was then proposed as an extra-metropolitan member.

Dr. KELLY then read his paper on the 'Distribution of Diphtheria in West Sussex'. He said that he was Medical Officer of Health to six Rural and three Urban Sanitary Authorities, the latter being Worthing, West Worthing, and Littlehampton. The soil differed in various places, being either galt and chalk, loam, or sand and gravel, with chalk below. The galt or heavy loam was damp, and the other soil dry. There were 84,000 inhabitants, of whom 52,000 lived on dry soil and 32,000 on retentive or damp soil. That the death-rate from diphtheria on the pervious soils was decidedly smaller than on the retentive. In Horsham, where diphtheria was always present to a greater or smaller extent, the rainfall was greater and the hours of sunshine less than at Worthing, and he found that, as a rule, diphtheria and excessive rainfall were coincident in most localities. He found that, in proportion to the population, 108 cases occurred in wet against 38 in dry places. Taking Kew as the best available returns for temperature, he found that in 1879, when the weather was cold and wet, there was an excess of diphtheria, while in 1880, which was comparatively warm, the number of cases was only about one-half of those in 1879. This was especially noticeable in autumn, when diphtheria was much more prevalent in cold and wet than it was in dry and warm weather. He had also, during the last six years, noticed a kind of antagonism between scarlet fever and diphtheria, for, when scarlatinal cases were few, those from diphtheria were in excess of the average. He had also met with a much greater number of cases amongst children between three and nine years of age than at other periods of life. As regards the fatality of the disease, he found that nearly 30 per cent. of the cases ended in death, and had also met with more cases in autumn than at any other period of the year. He thought that, in some localities, intermarriage might have had something to do with its prevalence, as it is well known that the disease is more fatal in some families than in others; and, if those who are predisposed to it intermarry, as they do in many country places, this may account for its increased fatality and frequency in villages. He had rarely noticed it spread in urban districts as it does in rural, and thought that the distance children had to go to school, and the frequency with which they sat in wet boots and clothes, had something to do with it. He had not noticed any local connection between diphtheria and diseases of cattle, or fluke disease in sheep, and he had not noticed the disease to be prevalent in well-drained or sheltered localities.

Dr. BOND said that his experience was decidedly opposed to Dr. Kelly's as regards the localities in which he had most frequently met with the disease, as there was but little diphtheria in Gloucestershire on clayey soil, whilst he had met with it most often on porous soils, and especially on high ground. He thought scarlet fever was often mistaken for diphtheria.—Mr. ELLISTON (Ipswich) had met with it most frequently on damp soil, and believed it was spread by direct infection, and to a great extent by school children.—Dr. FARRE had seen a small epidemic on an exposed situation at Norwood.—Dr. TRIPE had met with only one slight epidemic of diphtheria in the Hackney district, which occurred on high ground, and amongst those whose houses were directly connected with a certain system of sewers.—Mr. MURPHY had not found epidemic diphtheria and bad drainage to coexist.—The PRESIDENT proposed a vote of thanks to Dr. Kelly, and said he believed diphtheria to be decidedly contagious, and that mild attacks were often overlooked or treated as ordinary sore-throats. He mentioned several cases, within his own experience, where this error had happened, and also other cases he had met with in badly-drained houses.—Dr. VINEN was called to some cases in a house where there was a bad smell and a large quantity of sewage found on taking up the flooring-boards. One of the children affected died from the disease.—Dr. WILLOUGHBY had also treated some cases of diphtheria which occurred after the opening of a filthy drain.—Mr. CORNER had known diphtheria and defective fittings of the water-supply to be coexistent, as he believed, from contamination of the water with sewer-gas.—Dr. KELLY having replied, the meeting adjourned to the third Friday in May, which will be the last ordinary meeting of the season.

The *Annales des Ponts et Chaussées* states that Messrs. Easton and Anderson are testing the value of spongy iron upon a large scale in the filters of the water works at Antwerp. The water is first allowed to pass through a mixture of iron and gravel covered with sand, when it passes into a second basin, the bottom of which is covered with sand. The experimental results have been more satisfactory than those from ordinary filters, and there are no indications of any necessity for renewing the iron, which serves to oxidise the organic matters suspended in the water.

THE NOTIFICATION OF INFECTIOUS DISEASES.

ON the 26th ult., Mr. Dodson, M.P., the President of the Local Government Board, received a deputation from the British Medical Association, the Society of Medical Officers of Health, the Social Science Association, the National Health Society, and the Vestries and District Boards, to ask that the Government would give effect, by legislation, to means necessary to be taken to guard the public health from the danger of infectious diseases.

The deputation was introduced by Mr. HASTINGS, M.P., and Dr. FARQUHARSON, M.P., who explained the following points:—'That in the interests of public health, and to enable Nuisance Authorities to discharge the duty of checking and preventing the spread of infectious diseases, such as small-pox, scarlet fever, etc., provision should be made by legislative enactment to secure the compulsory disclosure to the said authorities of all cases of such diseases immediately after their occurrence; that the provisions of the 26th Section of the Sanitary Act, 1866 (Section 124, Public Health Act, 1875) are insufficient for the protection of the public health, and should be so amended as to empower any justice to direct the removal to a hospital within the district of the Nuisance Authority, of any person suffering from any dangerous infectious disorder, and being without proper lodging or accommodation which would enable him to be properly isolated, so as to prevent the spread of disease to other inmates of the same house, or to be properly treated; that the admission into hospitals, for the purpose of isolation, of persons suffering from infectious diseases, and being without proper lodging or accommodation, is eminently desirable in the interests of the public, and should be encouraged; that payment for the assistance given in hospitals to such persons removed thereto for isolation by the Nuisance or Poor-Law Authority should not be enforced; that the giving of such assistance should not entail on the recipients the loss of any social or political *status;* and that the cost of hospital treatment of such infective sick persons should be made a charge on a common fund.'

General BOILEAU, speaking on behalf of the vestries and district boards, urged that in some English towns the powers now asked had been adopted in local acts, and a Bill to give Ireland these advantages had been read a second time. As to hospitals for infectious cases, he thought the tendency of feeling was towards an increase of number in place of the increase of size of hospitals.

Dr. ALFRED CARPENTER of Croydon, as President of the governing body of the British Medical Association, explained that at the various meetings held in all the great centres of the country for years past, the medical men had almost unanimously assented to resolutions in favour of the views now laid before the Government, asking that steps should be taken to compel the disclosure of all cases of infectious disease.

Dr. BRISTOWE, President of the Society of the Medical Officers of Health, said that Mr. Sclater-Booth, when pressed to give effect to the views now presented, said that public opinion had to be educated on the point. That this end had now been attained, was to be seen from the large representative attendance, and the speaker then proceeded to give some striking cases of the spread of infectious diseases by the lack of power, on the part of the Local Authorities, to isolate persons thus afflicted. More was thought of the individual, by the present action of the law, than of the safety of the multitude. In the large Peabody Buildings, some containing 1,500 persons, a person smitten with infectious disease could not be removed, even though the whole population might be endangered. Dr. Bristowe also held that it would be a great mistake to multiply infectious disease hospitals in a place like London.

Mr. ERNEST HART, as Chairman of the Parliamentary Bills Committee of the British Medical Association, and as Chairman of the National Health Society, urged several additional points, which will be found in detail in the abstract published at page 410.

Mr. DODSON, in reply, said—I wish to point out with reference to the proposed compulsory notification of infectious diseases, that a mere notification of such cases would not advance very much a solution of the question. It appears to me that underlying the question of a notification of such cases comes the difficulty as to where people who become affected by disease are to be removed. What is to be done with such persons? No doubt persons well off, who have all necessary resources to fall back upon—persons who can afford to keep up large houses—such persons as these can effect the isolation of contagious cases at home. But what is to be done with persons who have no such facilities at their command—with people obliged to live in lodgings—with families who may have to put up with one or two rooms? What is to be done to secure isolation for classes of persons such as these? Underlying the whole question is also the consideration as to what sort of hospitals should be provided for such cases, and what sites should these hospitals occupy. That is a much more difficult matter than the providing by legislation for a compulsory notification of infectious diseases. The Sanitary Authorities throughout the country have power to provide hospitals, but the cases in which they have exercised that power are few. The great difficulty seems to be as to the sites upon which such hospitals can be established. In the metropolis, there are no compulsory powers for the provision of such hospitals—I mean no power to obtain sites by compulsion for the establishment of such hospitals. The difficulty experienced in finding such sites, not only in the metropolis, but in the large towns throughout the country, is consequently overwhelming. One gentleman (General Boileau) has said that a 'feeling' prevails in favour of small special hospitals for contagious diseases in the metropolis, but he said it was only a 'feeling'. The speaker who directly followed expressed a different opinion. I think Dr. Carpenter it was who expressed the deliberate opinion that a hospital for such cases should be provided in each central district. (Dr. Carpenter explained that his observation only applied to country districts, and not to the metropolis.) The real difficulty, after all, is how to provide hospital accommodation for such cases. The question to be solved is how that difficulty can be surmounted. I confess that, having so many medical gentlemen around me, and having heard them express their opinion on the subject, I should have been glad if, instead of mentioning what was the 'feeling' only as to the best means of dealing with contagious cases and preventing the spread of disease in the metropolis and large towns, they pointed out what they considered the best means. I should like to know, for instance, whether it is a safer course to have comparatively small hospitals for such cases, and to

leave each district to provide for itself, or to continue the present system of a few large hospitals. Which is the least source of danger? Is it better to have a large mass of disease concentrated in a few centres, or to have the disease centred in a large number of small districts? I should be glad if gentlemen so competent to speak on the subject would not shrink from giving their opinions as to this important point.

Dr. DUDFIELD, the Medical Officer of Health of the Kensington District (in which the Fulham Hospital is situated), said he had no hesitation in answering the question. A district like Croydon should have a hospital to itself; but it would be absolutely dangerous to have a separate hospital in the forty different districts of the metropolis. He did not believe that the Fulham Hospital had been the cause of any direct infection—for it was a quarter of a mile from any house; but the case would be different were such centres established in each of the well-housed districts of London. He suggested that, with a well-organised system of ambulances, the convalescent and mild cases should be removed out of London, and then the present hospitals would be amply sufficient.

Dr. CARPENTER endorsed these views, and added that if the Government would give, by means of legislation, the powers which would restrict the spread of infectious diseases, then the present hospital accommodation of London would be found amply sufficient.

THE DIFFICULTIES OF ISOLATION AND TREATMENT OF SMALL-POX AND FEVER IN THE METROPOLIS.

A MEETING of the Metropolitan Poor Law Guardians' Association was held on the 29th ult., at the Board-room of the Lambeth Guardians, Pleasant Place, Kennington, when Mr. J. H. RUTHERGLEN, Clerk to the Kensington Board of Guardians, read a paper on 'The Difficulties—legal and other—at present existing in the Isolation and Treatment of Cases of Small-pox and Fever among the Poor of the Metropolis.' After referring to the vital importance of the subject at this juncture, he remarked that previous to the Sanitary Act of 1866, no provision appeared to have been made for the isolation and treatment of small-pox. Alluding to the difficulties brought about by the decision in the Hampstead Hospital case, he said no Local Authority could provide accommodation for small-pox cases, or they would be liable to the same outcry. He thought the increase of small-pox in the neighbourhood of the hospitals was due to the defective sewerage, and not to the vitiated air theory, and it would be well if the whole of the managers of these small-pox hospitals adopted some more satisfactory means of disposing of the sewage by using some disinfectant, and having the sewers flushed daily. The difficulty that had arisen out of the Hampstead Hospital case applied to fever as well as to small-pox, and if the latter hospitals were to be closed the former would have to follow as a matter of course. The only way out of the difficulty would be for a Bill to be passed conferring power on the Asylums Boards to provide hospitals with or without the power of compensation, as might be determined upon. Provision should also be made for the notification of infectious diseases. He concluded by moving 'That this Association, believing the present system of dealing with contagious and infectious diseases in the metropolis to be fairly satisfactory, and recognising the danger of a decision the logical result of which would be to throw the responsibility of making provision for this disease upon the several Local Authorities in the metropolis, which may be placed under disabilities, as the managers of the Metropolitan Asylums District, strongly urge upon her Majesty's Government the need for an Act to define, and, if requisite, to enlarge, the powers of the Metropolitan Asylums Board and Sanitary Authorities in order to prevent the serious consequences which might result in the present uncertain state of the law whenever the metropolis may be visited by an epidemic of fever or small-pox; that the Government be asked at the same time to include, if practicable, in such Bill provisions for the compulsory notification of infectious diseases, for the compulsory removal to hospital of persons suffering from such diseases, for whom proper isolation and treatment cannot otherwise be secured, and for the non-pauperisation of recipients of this form of relief.' It was resolved to send a copy of the resolution to the Local Government Board and to all the Local Authorities in the metropolis. Mr. Rutherglen said he was informed that the Government were preparing a Bill to deal with the subject.

NATIONAL HEALTH SOCIETY'S MAYFAIR LECTURES.

THE second lecture of this course was given by Dr. Farquharson, M.P. (formerly Medical Officer of Rugby School), on the subject of 'Health in Public Schools'. Dr. Farquharson described the ideal situation of a school, and the arrangements necessary to be observed, in order to secure proper sanitary conditions. He was of opinion that in the erection of a school building the future Medical Officer of the establishment ought to be associated with the architect, so that sanitary safety might be combined with beauty of outline. Naturally, one of the most important features to be considered in the conduct of a school was its dietary; the viands should not only be wholesome, but should also be cooked and served in such a form as to make them palatable and attractive. In mental education, he advocated the study of a variety of subjects. He advocated the encouragement of outdoor games—under wise regulations—as necessary to the purification of the blood and the consequent healthiness of the brain. In fact, it was most advisable that the doctor should go hand in hand with the teacher in the management of the school, and nothing was of greater importance than that there should be a constant medical supervision, and that the medical attendants should be chosen with conscientious care.

On the 6th inst., Mr. C. N. Cresswell, barrister-at-law, delivered an interesting address on the 'Sanitary Relations of Local Self-Government'. He expressed his opinion very strongly that legislation for sanitary reform was useless if not supported by intelligent co-operation in families and households, as well as in parishes and corporate bodies; and he advocated the course taken by the National Health Society, in endeavouring to interest women of all ranks in the important questions of the laws of health. He thought that the improved education of women would render them more than ever capable of understanding thoroughly the nature of those sciences on which all effective sanitary effort must

be based; and he hoped much in the future from the fact that so many ladies of education and social influence were interested in these important matters. Mr. Michael, Q.C., took the chair on the occasion, and made a few significant remarks as to the influence of women—by example and precept—in the crusade against disease and infection. He spoke of the necessity of self-sacrifice in cases where perfect isolation was the only security against the dissemination of disease, and mentioned instances where maternal anxiety to nurse and tend one sick child had resulted in the spread of disease throughout a family, perhaps fatally. Personal sacrifice of feeling would have prevented such a catastrophe, and he called upon all women to be ready to make it when the occasion came.

THE BUILDING EXHIBITION AT THE AGRICULTURAL HALL.

THE late Building Exhibition at the Agricultural Hall, the second of its kind, showed a considerable advance on that of its predecessor held at the same place a year since, judged with regard to the number of the exhibits and their character. As usual in such displays, many exhibitors were present whose manufactures are well known to our readers, and whose appliances have been often noted in these columns. Repetition in such cases is superfluous, and unless some new features are visible we must necessarily pass them over with a recognition of their names.

Building appliances of the most varied character were to be found, both for exterior and interior decoration, but the display did not end here, articles of domestic utility and luxury figuring extensively in the collection. Probably, the finest display of grates, mantelpieces, fenders, fireirons, etc., was brought together on this occasion that was ever seen at one exposition, and it was remarkable for having attracted the largest number of smoke-consuming and fuel economising grates and stoves we remember to have seen. In this department we may mention the American and Canadian stoves of Messrs. Duff, Last and Co., of Cannon Street, and Mr. Harry Hunt of Newington Green Road, the latter burning anthracite coal. Messrs. Steel and Garland, Holborn Viaduct, with their Wharncliffe slow-combustion and ventilating grate, burning anthracite, which has already been described in our columns. The General Iron Foundry Co., Upper Thames Street, with a new slow-combustion stove, burning anthracite coal very effectively, and another called the 'Kyrle' grate, invented and manufactured by the Coalbrookdale Company, and shown by Mr. Addis of Leicester Street, Leicester Square, which is, we believe, destined to play an important part in the future, in this class of heat-distributors, and one which the Anthracite Coal Company will point to with considerable pleasure, as illustrating the splendid fire their fuel is capable of producing in an open grate made on scientific principles. We propose, as soon as the drawings of the two last-named are complete to give a detailed description of them. Other exhibitors in this line were the Wilson Engineering Co., High Holborn; Robertson and Co., Cheapside and Glasgow; Messrs. Brown and Green, Bishopsgate Street and Luton, Bedfordshire; and the Eagle Range Co., of Fleet Street and Birmingham, all the last named showing kitchen-ranges in full work.

The only exhibitors of gas-cooking and heating-stoves to any extent, were Messrs. H. and C. Davis of Camberwell Road, whose manufactures have already received due attention at our hands. Messrs. Davis's display was extensive, and embraced nearly every kind of gas-stove, both for heating and cooking, for which the firm is famous, as well as a numerous collection of cooking utensils, mostly of the new kind of enamelled ware, as originally introduced by American firms, suitable for gas-cooking stoves.

The largest and most varied collection of goods shown in the hall was undoubtedly that of Messrs. Wells and Co., of Shoreditch, and the palm of honour was universally accorded to them. Situated at the east end of the hall, which they entirely occupied, their collection elicited general admiration. Marble, enamelled slate, and wood mantelpieces from the simplest to the most costly, with register-grates, fenders, tile-hearths, fire-brasses, etc., *en suite*, all of the most modern character, figured conspicuously, supplemented with elegant chimney-glasses, clocks, bronzes, etc., and gas-fittings of the most elaborate outlines, formed an almost independent display. Baths and lavatories of the most approved construction were no less interesting, and kitcheners of a variety of sizes and styles, left little to be desired on the part of those who were in search of the best class of culinary appliances. Builders' iron work, including railings, palisading, spiral staircases, etc., which Messrs. Wells and Co. manufacture largely at their works in Shoreditch, were interspersed amongst the numerous articles we have named, and the whole was independently illuminated at night by means of the electric light, which the firm use in their own works, and undertake to erect for those requiring it. If not so large, the collection of Messrs. Steel and Garland, in mantelpieces of marble and wood, grates, tile hearths, kerbs, etc., was perhaps the most choice in the building. Some of the grates were entirely new patterns, shown for the first time at this exhibition, and in the selection of tiles, of which these goods are now largely composed, they exhibited great taste, most of them being hand-painted and exquisite specimens of the porcelain painter's art. To attempt to give special descriptions, when all were good, would require more space than we have at command, but to those requiring decorations for the fireplace, we would suggest a visit to the show-rooms of this firm on the Holborn Viaduct before deciding on their purchases. Of a somewhat similar character was the display made by Messrs. Yates, Haywood and Co., of Upper Thames Street and Effingham Works, Rotherham, amongst the collection being a very handsome stove entirely encased with tiles, having an ascending flue similarly mounted, adapted for halls, ships, or yachts, cabins, etc. Messrs. George Wright and Co., Queen Victoria Street and Rotherham, also showed to advantage in high-class grates and mantelpieces. Messrs. Ashton and Green of Bury Street, St. Mary Axe, the eminent marble masons, and enamelled-slate manufacturers, who have in addition several branch establishments throughout the kingdom, and even in the sister isle, were conspicuous for their display, which comprised, besides some admirable specimens of mantelpieces in the materials we have named, grates, kerbs, tile-hearths, etc. There were five drawing-room suites, complete, of a *recherché* character, and eight suitable for dining-room, library, and hall, the mantels of a portion of these being of enamelled-slate, in imitation of some of the most costly marbles, and but little inferior in appearance to the real stone

itself. Kitchen-ranges of various grades, from the one suitable for a mechanic's home, to that adapted to the mansion, embellished with tiles, and containing all the modern improvements, were no less worthy of note; and baths and lavatories also formed a portion of the display. The firm were no less conspicuous for their collection of tesselated tiles for churches, halls, etc., and for their display of hand-painted art-tiles; while standing boldly out, as a *chef d'œuvre* of modern art, was an exquisite specimen of an enamelled-slate dado, embellished in the neutral tints which appeal so unmistakably to those whose æsthetic tastes have rendered this style of colouring so popular.

As makers of kitchen ranges, middle-class grates and stoves, cast-iron baths, and builders' ironwork generally, Messrs. Steven, Brothers and Co. of Upper Thames Street, and the Milton Iron Works, Glasgow, left nothing to be desired. Proprietors of one of the most extensive foundries in Scotland, their productions in architectural and general ironwork are widely known, and they have the reputation of being one of the cheapest houses in the trade. Some of the special features in ornamental cast-iron they have from time to time made to order, have probably been second to none of their kind that has emanated from any of our foundries, and their facilities for production are of the first order. Their collection at this exhibition comprised a large and varied assortment of grates and ranges, amongst the latter being a handsomely finished one for a hotel or a clubhouse, ventilated by a system of their own, by which all the fumes from the utensils in use are effectively carried into the chimney. Balusters, palisades, verandahs, and builders' ironwork generally, helped to make up one of the most interesting exhibits to the builder and architect in the hall.

Another Thames Street house, who made a good display of enamelled slate mantelpieces and register grates, was Messrs. Ford and Margrett, whose works are at Camp Hill, Birmingham, and mantelpieces in marble and enamelled slates were exhibited rather extensively by Messrs. Gee and Co. of Gloucester and Southwark Street, a few samples of elegant marble mantelpieces being also contributed by Mr. G. Mitchell of Upper Thames Street.

Of ordinary building materials the collection was most extensive and of the most multifarious character, though we failed to discover many particularly new features. One of the most attractive in this department was the exhibit of Messrs. Wilcock and Co., Burmantofts, Leeds, whose specimens of faïence and terra-cotta wares drew together, from time to time, a large number of admirers. Intelligence and taste of no mean order had evidently been thrown into the productions of this firm, which consisted of the many features to which this ware may be made applicable to exterior decoration, at the same time its uses to interior embellishment were not forgotten. Panels and plaques to decorate furniture, which will prove keen competitors with tiles, were amongst the latter; and it was clearly shown that the material may be effectively and usefully carried out for many other interior uses. Turning to sanitary appliances proper, we may mention a new strong stoneware closet, in the sectional form of a trough, of such a thickness that the wooden riser is unnecessary, the seat being the only part in which the vegetable material is required. It can be readily cleaned, and, for hospitals, factories, schools, etc., should be an invaluable addition to sanitary arrangements.

In the class of work coming under the head of sanitary engineering, we had no lack of exhibits, Messrs. Smeaton and Son of Moorgate Street, and Howland Street, Tottenham Court Road, having the largest and most costly appliances, Messrs. Pontifex and Wood of Shoe Lane and Derby being also prominent in a no less necessary but different class of exhibit. Messrs. Brazier and Son, Blackfriars Road, were present with their patent direct-action water-closet; Mr. Ramsay, Farringdon Street, with Jewell's patent closet; Messrs. G. Waller and Co., Holland Street, Southwark, with a variety of their specialities; Mr. Parker, Woodstock, Oxon, dry earth closets; Messrs. Doulton and Co., Lambeth, whose principal features are now being exhaustively described in successive issues of the SANITARY RECORD; the Birmingham Sanitary Association, 47, Coleman Row, Birmingham; Mr. Gregory, Station Works, Clapham, with the Shrewsbury closet; the Antiseptic Apparatus Manufacturing Company, Harrow Road; Parnell and Sons, 15A, Kensington Place, Page Street, Westminster, water-waste preventers, etc.; Braithwaite and Co., Leeds, syphon cisterns for water-closets; and Messrs. Bean, 5, Cannon Row, Westminster, with their patent flushing apparatus.

Mr. Robert Adams, Great Dover Street, Southwark, exhibited a number of ingenious appliances connected with windows and doors, amongst which his patent fanlight opener showed to advantage. By merely turning a small handle, a simple piece of mechanism enables a fanlight to be opened to any required space, and 'lights' can be hung on this principle in any position. A new patent safety window was also conspicuous, enabling the sash to be instantly changed from a vertical sliding into a swinging position, which facilitates cleaning and renders accidents during that operation next to impossible. His patent compensating spring hinges for heavy doors are no less meritorious. Weather-tight sill bars, and other kindred appliances, go to show that Mr. Adams has made comfort as regards the doors and windows of our houses his especial study. Arrangements for giving ventilation to windows, and for facilitating the cleaning, appears to have occupied the attention of several other persons. Mr. E. Davey, 25, Edward Street, Hampstead Road, showing a similar arrangement for swinging sashes, and John Tomlinson and Sons, Victoria Road, Leeds, having a similar appliance, each of which have their especial advantages.

Blinds of all descriptions, suitable for every variety of purpose, were in great variety. Messrs. Janes and Son, Aldersgate Street, Paul Metz, Jewin Street, Taylor and Son, East Road, City Road, Haskins and Brothers, 24, Old Street, E.C., showing to advantage; but the most commendable specialities were exhibited by Messrs. Avery and Co., 81, Great Portland Street, whose short Japanese blinds in particular were a novelty and elicited universal attention, and Messrs. Hodgkinson and Clarke, Small Heath, Birmingham, whose 'Queen Anne' blind, revolving shutter and ventilator combined, was one of the notable features in the exhibition in this department. Closely connected with this branch of the exhibition were the display of shutters of the revolving type, which have now become so simplified as to render them adaptable to private dwellings, when considered necessary, and made of steel, iron, or wood. In this department may be mentioned Messrs. Clarke, Bunnett, and Co., limited, of Queen Street, Cheapside, and Rathbone Place, whose specialities have gained merited popularity; and Messrs. Salmon, Barnes, and Co., Ulverston, who

work their appliances by a patent balance-weight motion and friction pulley. In ventilators, cowls, etc., there was a numerous collection, Mr. Ellison of Leeds, being present with his well-known conical ventilators, patent air diffuser, etc.; Mr. J. Moore, Sekforde Street, Clerkenwell, improved glass louvre ventilators, adapted for a variety of uses; Messrs. Boyle and Son, with their many appliances for this purpose; Gilmore and Clarke, High Street, Lower Norwood, the 'Autothermaton', an ingenious invention which can be regulated to act at any given temperature; and an induced current air-brick ventilator, which creates out-draught but prevents its ingress. The Universal Ventilating, Sanitary, and Engineering Company, limited, Lewisham Bridge; Stevens' patent exhaust ventilators, and exhaust chimney tops; Messrs. Sharpe and Co., Newgate Street, whose inventions are known to most of our readers; Mr. J. D. Wright of Lupus Street, Pimlico, with the 'Climax' smoke preventive chimney-pot and ventilator, an appliance that has won for itself numerous admirers; and Mr. Jas. Howarth of Farnworth, near Bolton, whose various productions have gained a continental as well as home notoriety.

The Rustless and General Iron Company, Queen Street Place, Cannon Street, exhibited a variety of wrought-iron tubes and fittings, coated by Barff's patent process, which renders them rustless and incorrodible, by means of super-heated steam. Iron for various purposes, including roofing tiles so heated, were also shown; and as the cost of this process is reduced to about the same as galvanizing, the superiority in an economic sense, is inducing a considerable demand for goods to which it can be applied. A variety of ingenious hot-water appliances, intended to supersede hot-water circulating pipes, were contributed by Mr. Stevens, Loam-pit Vale, Lewis Lane, S.E.

A good collection of paints, varnishes, etc., were amongst the exhibits, our attention being drawn in particular to Balman's luminous paint, exhibited by Ihlee and Horne, 31, Aldermanbury; the Silicate Paint Co., Cannon Street; and Stephens', 191, Aldersgate Street, various stains for woods. Materials for interior decoration were displayed by Messrs. Walton and Co., 9, Berners Street, whose Lincrusta-Walton, or Sunbury wall decoration, is rapidly increasing in use. Being waterproof and impervious to damp or moisture, it can be washed with soap and water without injury, and it is said to be proof against absorbing infection. It has a warm and comfortable appearance, and the uses to which it can be applied are a of multifarious character. Of a somewhat similar character is the invention of the Papyrotile Company, 14, Holborn Viaduct, which can be adapted to kindred purposes, and the comparative cheapness of which should render it extremely popular. Messrs. F. Winterhoff and Co. of Worcester, exhibited a meritorious invention for enamelling and ornamenting iron and slate in ceramic colours. By this process it is claimed that the ornament is applied 'directly', and not under the methods hitherto attempted by transfer; the *modus operandi* employed being vitreous enamels, as distinguished from vegetable. The vitreous process is said to produce a surface as hard and imperishable as granite.

A good collection of school furniture was exhibited by Mr. S. Mead, Tillingham Street, Sparkbrook, Birmingham; the reflex school desk and bench being one of the prominent features. This furniture is at once convertible into ornamental seats with backs. Folding forms and tables, admirably adapted for transport for school treats, etc., formed a conspicuous portion of the exhibit, and a reflex library or surgery chair and writing desk will be found a useful appendage to many of the profession. In water-filters we had the 'Filtre Rapide' of M. Maignen, Great Tower Street, which has been fully described in our columns. It has not yet been thoroughly introduced to the trade for sale; M. Maignen has however been experimenting with various materials to form his matrix, and it will be found, we believe, that asbestos will eventually take the place of felt, as originally used by him. The Silicated Carbon Filter Company and Messrs. Lipscombe and Co. were the other exhibitors in this section. Messrs. Treggon and Co., Brewery Road, London, exhibited a good assortment of their well-known productions, the most interesting feature being a new hydrometer, or water-level indicator, for showing at a distance at what height water or other liquid stands in tanks, etc. It consists of a dial, similar to that of a steam-gauge (but graduated to indicate feet and inches), which may be fixed in an office, or other convenient place, the altitude making no difference to its action. A pipe of ¼ in. diameter is sufficient to connect the indicator with the tank.

One of the greatest novelties for the purpose of flooring, etc., is that of Webb's decorated woods made at the Worcester Tileries, Worcester. This invention is the staining through any porous substances, such as wood, leather, papier maché, and numerous other articles, as fully described in the SANITARY RECORD of November 15, 1880, page 166. Messrs. Webb had a large assortment of these wood tiles in various patterns and designs. The tiles have all the appearance of the finest inlaid work without the disadvantage of shrinkage, and will doubtless be adopted for hospitals, churches, law courts, and other public buildings where noiselessness is a desideratum. They can be adapted to old or new floors, and are equally suitable for walls, ceilings, dados, etc.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

HARBORNE.—Dr. Wagstaff Smith's annual report on this district is statistical only. It shows a death-rate of 21.32 per 1,000, which is stated to be an improvement on that for 1878. Only three deaths occurred from scarlet fever, one from typhoid fever, and one from diarrhœa. Out of the total number of 132 deaths, bronchitis caused no less than 25, and pneumonia and pleurisy 16. Thirty-five of the deaths were those of children under five years of age, and two persons were stated to have reached 100 years. The deaths in the district are largely increased by a Roman Catholic Institution for the aged and infirm, called 'St. Joseph's Home', where 32 persons died in 1879.

HEPBURN.—For this district, Mr. Spear has a much more satisfactory state of affairs to record than for 1878. The scarlatina epidemic which was so fatal in 1878, had subsided in 1879, and the only zymotic disease that was at all prevalent, was whooping-cough, and which caused in all 25 deaths. The most unsatisfactory feature in the death returns is the extremely high mortality amongst children under five years of age, no less than 59 per cent. of the total deaths occurring before this age was reached.

Mr. Spear does not attempt to explain this mortality, though it clearly deserved more notice. The general death-rate of the year was 20.1 per 1000, the lowest record for Hepburn. Five imported cases of typhus fever had to be dealt with during the year, 14 of typhoid, and 18 of scarlet fever. Mr. Spear laments the absence of a hospital, the negotiations for which dragged their slow length along for some years, and then were abruptly broken off. The most pressing need of the district, however, would seem to be a reform in the present system of scavenging, by the Authorities undertaking it themselves. This, though it has been under the consideration of a Special Committee for a long time, has not yet been effected. The report shows that, as regards ordinary sanitary work, Mr. Spear has done his best in securing the carrying out of improvements.

HUDDERSFIELD.—The quarterly death-rates for this borough during 1879 varied very considerably, being 28.1, 24.8, 19.6, and 20.0 per 1000. The improvement in the health during the latter half of the year, reduced the annual death-rate to 22.95 per 1,000, as against 22.04 in 1878, and 22.37 in 1877. The death-rate from zymotic diseases during the year was 2.78 per 1,000, a fraction higher than the rates of 1878 and 1877, but not so high as those of 1876 and 1875. Scarlatina was very prevalent, especially during the earlier part of the year. A large number of scarlatina patients (158) were admitted to the fever hospital; bnt the accommodation was insufficient for the needs of the borough during the year, so that a new pavillion has been erected. Measles was very prevalent, and caused 16 deaths. The deaths from continued fevers was fewer than during the two previous years, having been 23 against 31 and 29 in 1877. Whooping-cough caused 33 deaths, but from diarrhœa the town suffered unusually little. The compulsory registration clause was more carefully attended to than formerly, though still leaving much to be desired; it has, however, now been amended by an Act of last Session. A special survey of a part of the borough called Lindley, formed an important part of the labours of Dr. Spottiswoode Cameron during the year.

ISLINGTON.—Dr. Tidy would probably be the first to admit that his report on this parish for 1879 is greatly inferior to its predecessors. It consists merely of the year's statistics, with a few meagre comments upon them; the help to the sanitary world at large, which might be expected from the experience of a large and important district such as Islington, being wholly wanting. This is not as it should be, but apparently a fuller report must not be looked for from an officer of Dr. Tidy's numerous and varied avocations. During the year 1879, 9917 births and 5321 deaths were registered at Islington, the population of which is now estimated at 277,363 persons. The death-rate was 19.1 per 1,000, which is identical with the rate of the previous year. The deaths from diseases of the respiratory organs (more especially bronchitis), were far above the average, indeed above any year yet recorded. Measles caused the unprecedently large number of 210 deaths, all of which, with but nine exceptions, were in children under five years. Whooping-cough existed in an epidemic form, and caused 229 deaths. Diarrhœa was much less fatal than usual, only 104 fatal cases being registered. During the year 76 samples of food were analysed, the majority of which were genuine. A total of 624 bodies, or a daily average of 1.71, were received at the mortuary, and 331 inquests were held. The cow-houses and slaughter-houses underwent their usual inspection, and were found in a satisfactory condition.

JARROW.—The interest in Mr. Spear's report on this district mainly centres on a very interesting description which he gives of the great value of the notification of infectious cases made compulsory at Jarrow in 1878. The facts are too long to quote, but it may be said generally that the information as to infectious cases has already been turned to very notable practical use. Especially was this the case with regard to an outbreak of typhus fever in 1879, which Mr. Spear says would otherwise almost certainly have become epidemic. He observes that by receiving this information, and acting upon it, 'we retained an effectual grasp upon the disease; when even a finger was relaxed, we could see, as it were, by its effects, the infection oozing away; when the grasp tightened it was stayed.' Action was also taken under the exceptional powers conferred by the Local Act in closing shops, dairies, etc., in preventing persons living in infected rooms from working at certain employments, and in employing nurses for the tending of the sick. The birth and death rates of the borough were 40.8 and 19.5 per 1,000, both below the average. 46 per cent. of the deaths occurred in children under five years, and 26 per cent. in infants under one year. Infant mortality appears in recent years to have declined at Jarrow. The zymotic death-rate was 3.3 per 1,000, a considerable reduction on the rate of the two former years, and due to the lessened scarlatinal fatality. Typhus fever, after several years' absence, broke out, attacking 99 persons, and killing 18. Thirteen cases of typhoid fever were heard of, and 38 of scarlet fever. The hesitation of the Town Council to provide hospital accommodation, especially after their recent experience of typhus, is greatly to be deplored.

LAMBETH.—For the year 1879 Dr. Archer Farr records a total of 9,250 births, and 5,767 deaths in this enormous district, equal to rates of 34.6 and 21.6 per 1,000. The proportion of deaths of infants to the total deaths was 22.4, and of children under five years, 41.5 per cent. A total of 953 deaths occurred from zymotic diseases, this number including the fatal cases occurring amongst strangers in the Stockwell hospitals. These stranger deaths numbered 148,93 of which (49 in the fourth quarter) were from scarlatina alone. Small-pox caused 26 deaths, measles 117, scarlatina (which was rife in three of the sub-districts) 294 deaths, diphtheria 60, whooping-cough 229, typhus 12 (9 of strangers), enteric fever 72 (32 of strangers), and diarrhœa 132 deaths. A total of 2,415 nuisances were abated during the year, and all cases of infectious diseases received the prompt attention of the sanitary inspectors.

LIVERSEDGE.—Dr. Sykes is not slow to tell his authority of the mischievous results of the present unwholesome system of excrement disposal at Liversedge, and of their neglect to undertake the scavenging of the district. Some little improvement over former times is perceptible, but the whole system needs to be radically reformed, and the atrocious middensteads absolutely swept away. In addition to the perpetuation of these evil-smelling contrivances, the construction of back-to-back houses is still permitted, to the manifest disadvantage of the health of the inhabitants. In 1879 there were 454 births and 261 deaths in the district, equal to rates of 33.73 and 19.39 per 1,000. Both are lower than the figures of the two previous years. Scarlatina

was present during the earlier months of the year, and destroyed 12 lives. Measles also became prevalent towards the end of the year. Diseases of the respiratory organs were more fatal than usual, but not so fatal as in 1876.

LOUTH RURAL.—The particulars given in Dr. Domenichetti's report with regard to sanitary improvements are very full, and in this respect the report is quite a model. A large number of notices were served by the inspector of nuisances, and after Mr. Brown's Water Act came into force many having reference to water-supply were issued. Much was done to improve the water-supply, and upwards of sixty samples were analysed. Drainage works at Mablethorpes, a growing place at the sea-side, were completed during the year; but the water-supply of the place seems to be very unsatisfactory. An appreciable improvement is taking place in the cottage dwellings, a number of houses having been closed during the year as unfit for habitation. The births and deaths for 1879 numbered 734 and 377 per 1,000, equal to rates of 29 and 15.2 per 1,000. Pulmonary diseases caused us less than 109 deaths, of which 35 were from phthisis. Scarlatina caused 11 deaths, principally in the Northern district; and whooping-cough, which was very prevalent, 8 deaths. The deaths from the other zymotic diseases were too few to need notice.

NEWINGTON.—Dr. Iliff does not give the birth and death-rates of 1879 for the extensive district under his charge, apparently because the 'very great increase in buildings in Newington, and their character, render any estimate of the number of inhabitants quite useless'. During the year, there was a total of 2,664 deaths, of which 645 were in infants under one year, and 639 of persons aged 60 years and upwards. There was a decrease in the mortality of small-pox, whooping-cough, enteric fever, and diarrhœa, but an increase in each of the other infectious diseases. We should have been glad to see some particulars given as to the circumstances under which the infectious cases occurred, but nothing of this kind is given in the report. The sanitary work effected appears to have been steady.

NEWTON ABBOT RURAL, WOLBOROUGH and DAWLISH.—This combined district, which is under the charge of Mr. Leonard Armstrong, shows a certain amount of progress during 1879, though there is still a great deal to be done. In the rural district the mortality was slightly above the average, giving a death-rate of 18.37 per 1,000, against an average of 18.13. About 26 per cent. of the deaths were in children under five years of age. Acute pulmonary affections were unusually prevalent, and a peculiar form of pneumonia, possessing apparently an infectious character, also came under notice more than once. The mortality from infectious diseases was lower than in the previous five years, measles being the most fatal of these disorders. Twenty-four 'outbreaks' of enteric fever came under notice. Scarlatina also cropped up every month of the year, and diphtheria and diphtheritic croup showed themselves in a very alarming manner amongst the children attending Chudleigh Knighton School in November. At Wolborough there were 134 deaths (equal to a rate of 19.73 per 1,000), 37 per cent. of which were in children under five years of age. An outbreak of measles became pretty general at midsummer, but the other zymotic diseases were not prevalent. At Dawlish there were 61 deaths, equal to a death-rate of 16.44. The deaths amongst old persons aged 60 and upwards were 44 per cent. of the total deaths. The district was almost entirely free from infectious diseases, but bronchial affections were, as also at Wolborough, very prevalent and fatal. The absence of any tabular statements is to be regretted as detracting from the value of the report.

PADDINGTON.—The death-rate of Paddington in 1879 was higher than it has been since 1875, a result due to the greater mortality from diseases of the respiratory organs. During the registration year there were 2,912 births and 1,939 deaths, equal to rates of 25.6 and 17.06 per 1,000 respectively. The mortality amongst infants and young children was more favourable than usual, the proportions to the total mortality being 20.8 and 35 per cent. The seven zymotic diseases caused 243 deaths, equal to a rate of 2.1 per 1,000, against 3.3 in all London. Measles and scarlatina were more than usually fatal, but fever and diarrhœa both showed a reduction. Dr. Stevenson gives a long description of the abortive efforts which have been made to secure the cleansing of the Grand Junction Canal during the last twenty-five years, and leaves it to the Vestry to determine how much longer it is to remain virtually an open sewer.

PORT OF LONDON.—Dr. Collingridge, the successor to Mr. Harry Leach as Health Officer of the Port of London, has issued in one volume the customary half-yearly statements of work done in the port during the periods ended December 1879 and June 1880. During the former period Dr. Collingridge was not in office; but with the praiseworthy object of preventing a break in the continuity of this valuable series of reports, he gives the figures for both half-years. In the two periods in question 15,499 vessels of all classes were inspected, recommendations as to cleansing or improvements in ventilation being made in 487 instances. A total of 132 sick seamen were referred to the Seamen's Hospital, Greenwich, and 86 cargoes were disinfected and removed. In referring to the school-ships moored in the Thames, Dr. Collingridge says that in two only of the seven ships, containing altogether between two or three thousand boys, were any cases of zymotic disease observed during the later half-year, and the sanitary condition of most of these establishments remained very satisfactory during that period. The promised report on the pollution of the Thames will be awaited with interest, particularly in view of the puzzling outbreaks of 'fever' that occur at intervals on board the training ships.

ROTHERHITHE.—Dr. Browning prefaces his annual report for 1878, which is extraordinarily late in appearance, with a comparative picture of the state of Rotherhithe in 1856 and at the date of writing, and he shows what large and important improvements have taken place there of late years. From a general death-rate of 30 per 1,000, and a fever-rate of 23 per 1,000, the district has now advanced to an average rate of 18.6 per 1,000, and a zymotic rate of 3.6, while it has doubled in population and density. Evidence of progress like this must be regarded as satisfactory; and there is evidence that Dr. Browning is doing very good work in the district in checking the spread of disease, and in the repression of nuisances. The birth-rate of 1878 was 41.5, and the corrected death-rate 18.8 per 1,000. The child death-rate was 43.1 per 1,000, of the infant rate 33.5 per 1,000, against an average of 48.3 and 38.7. This is, however, by far too large a proportion, and deserves the serious consideration of the local authorities. The seven principal zymotic diseases caused 155 deaths, or a rate of 4.6 per 1,000. Owing to the position of Rotherhithe, a good many violent deaths

occur; but the district is fortunate in having a mortuary for the reception of the corpses.

ST. GILES.—This district is remarkable in being composed of two entirely dissimilar localities—the crowded purlieus of Seven Dials and Drury Lane, and the spacious open squares of Bloomsbury. In the whole district there were in 1879 1,495 births, equal to a rate of 27.9 per 1,000. The deaths during the same period numbered 1,207, or a rate of 22·5 per 1,000. This rate is slightly higher than in 1878, but is 2.0 below the decennial average. Of children under one year of age 246 deaths were registered, and of children under five years 428 deaths. The zymotic death-rate was 2.4 per 1,000, considerably below the average. Of the 157 deaths in this class, 114 were of children under five years of age. 18 children died from measles, 38 from scarlatina, and 38 from whooping-cough. Typhus fever, which had been absent since 1874, made its re-appearance in 1879 in its old haunts. Altogether 22 persons were attacked by it, and 4 of them died. Typhoid fever caused 8 deaths, and diarrhœa 22, against 50 in 1878. During the year 96 inquests were held, and 14 deaths were returned as not certified. Mr. Lovett has a satisfactory amount of sanitary work to record, though the working of the Artizans' Dwellings Act in the district is hardly encouraging.

SIDMOUTH.—Though a good deal has evidently been done to remedy the defective conditions in this watering-place described by Mr. Netten Radcliffe in 1877 (see vol. viii., p. 322), yet much more remains to be accomplished. Thus, while improved cottages have been erected, a mortuary built, more closets provided, cesspits nearly abolished, piggery-nuisances diminished, and more ventilators made to the sewers, the water-supply, especially of Eastern Town, is defective, and the sewerage is still 'under consideration'. Dr. Pullin has evidently done all in his power to keep the district healthy, and to maintain its reputation as a watering-place. The mean temperature of the year was 47.1 degrees, or only a quarter of a degree lower than Penzance and Torquay. During the year there were only 72 births, equal to the very low rate of 20.3 per 1,000. The deaths numbered 70, or 20 per 1,000, of which 10 occurred under the age of five years. In referring to the infantile mortality Dr. Pullin speaks strongly of the evil effects of the substitution of the bottle and 'farinaceous trash' for milk during the first year of life. Nine of the deaths were those of visitors who came into the district with their fatal illness upon them, and one was an inquest case. There were but two deaths (one that of a visitor) from phthisis, a disease from which the town is peculiarly exempt.

STOCKTON RURAL.—This is an unusually good specimen of a report for a rural district, giving particulars as as to the several cases of infectious disease observed during the year, and stating in detail the improvements effected in the various localities. A house-to-house survey has made satisfactory progress, and this, as well as the frequent systematic inspections made by Mr. Wilson, testify to the earnestness of sanitary work in the district. For 1879 the birth and death rates were 32 and 14.4 per 1,000, against 30 and 19.2 in 1878. The decrease in the mortality seems to be to a great extent due to the much smaller prevalence of measles, and scarlet fever, and whooping-cough, which were very fatal during 1878. The proportion of deaths under one year to the births was at the satisfactorily low rate of 40 per 1,000.

STROUD RURAL.—Mr. Partridge adopts the useful plan of summing up the sanitary improvements effected in each village in his district, though, unhappily, he has but little of improvement to record. He observes that, with its natural advantages as to soil and water-supply, the district should be one of the healthiest in England, and would be so but for the 'utter disregard of sanitary laws on the part of some'. 'Private avarice and selfishness on the part of owners of small properties' apparently stand in the way of sanitary action, however important or urgent. The water-supply of the district especially requires sustained attention from the local authority. As elsewhere, diseases of the respiratory organs were very fatal, and swelled the death-rate beyond its normal proportions.

TAUNTON, URBAN and RURAL.—More sanitary work seems to be doing in the urban than in the rural district under the charge of Dr. Alford. An extension of the sewerage, the condemnation of many foul wells, and the repression of a great number of nuisances are reported in the town, but in the rural district Dr. Alford says of the faulty drainage of certain places that 'beyond being reported, nothing is as yet done,' and complains that many cases of polluted water have been reported, apparently with no benefit to the places concerned, and that nuisances prejudicial to health, though reported at every meeting of the Board,' still exist, and require constant attention to keep them in abeyance. One great move on the part of both authorities must, however, be recorded. A hospital of four wards has been jointly provided by them, with results that are already satisfactory, and promise to be more so. The mortality statistics of the districts present no special features. Whooping-cough was prevalent in the beginning of the year, and scarlatina and enteric fever were also present in various places. The mortality from diseases of the respiratory organs was very high, so that the general death-rate of each district was raised over the average. In the rural district it was 18.5, and in the town as high as 23.9 per 1,000.

WANDSWORTH.—The birth and death rates of this great and rapidly increasing district must needs be subject to considerable correction when the census returns of the present year are published; but, on the best estimate of the population procurable, the rates were in 1879 39.7 and 20.5 per 1,000. The deaths from zymotic diseases were more numerous than usual, measles and scarlatina being very prevalent and fatal. On the other hand, there was a considerable decrease in the diarrhœa mortality, and a trifling decrease in that from diphtheria and whooping-cough. The mortality from diseases of the respiratory organs was very heavy, no less than 891 deaths out of a total of 3,526 being ascribed to lung diseases, exclusive of phthisis. About 21 per cent. of the deaths were in infants under one year, and 46 per cent. in children under five. The mortality amongst the industrial classes was 73.4 per cent. of the total. No less than 89 uncertified deaths were recorded, a proportion upon which the health-officers look with considerable suspicion. As usual, Messrs. Kempster, Oakman, McDonogh, Nicholas, Sutton, and Walker make separate reports on the sub-divisions of the district under their charge; but nothing unusual is recorded in these summaries, except that Mr. Oakman records a case of sanitary perversity that must surely be phenomenal. A case of diphtheria occurred in a house where the water-cistern was found to be immediately under the closet-pan. Sawdust was placed on the cover to soak up

the drippings from the closet, which was saturated. 'As might be expected,' says Mr. Oakman, 'all in the house had the disease, and two of them died.' Is there no law that will reach such malfeasance as this.

WEDNESBURY.—This large urban district seems to be improving slowly, though there is still a very great deal to be done before the place can be accounted healthy. Mr. Garman's reports are not printed in any worthy manner, so that it is impossible to check the progress that is actually making; but there are indications that the sanitary wants are not lost sight of by the health officer at least. An improvement was manifested in the death-rate of 1879, as compared with 1878, the rate being calculated as 17 per 1,000. Of zymotic diseases, scarlatina was much less fatal than in the preceding year, and so was whooping-cough. Measles was very prevalent, but only 7 deaths occurred from it. Pulmonary diseases caused 134 deaths, exactly the same number as in the previous year. The infantile mortality was lower than it had been during the previous four years.

WOLVERHAMPTON.—Mr. Love's report we can hardly regard as adequate for a large town of nearly 80,000 people, such as Wolverhampton; but the internal evidence of the report shows that his work is more satisfactory than his reporting. An unusually good report by the Sanitary Committee prefaces the remarks of the medical officer, and shows much intelligent appreciation of the sanitary wants of the borough, The report is for the twelve months to September 1880, though why this irrational period is persevered in is not stated. During this period the death-rate was unusually low, mainly owing to the diminished number of deaths from infectious disease. The death-rate amongst children is still, however, enormously high, and was largely increased by an unusually severe epidemic of diarrhœa. The heavy death-rate is greatly localised on an area which contains the worst property of the district, many of the houses being unfit for habitation; and the Committee urge upon the Council the desirability of hastening on an improvement scheme. They have had under their consideration the question of uncertified deaths, and they think an alteration of the law very desirable. The work of sanitary inspection was well maintained during the year, and 111 wells were closed. A disinfection oven and mortuary are desiderata for the borough which must be provided before long.

SANITARY INVENTIONS.

GAS IN ITS APPLICATION TO THE HEATING OF BATHS.

(Continued from page 394.)

HAVING, we hope, effectually disposed of the statement that no atmospheric burner is free from carbonic oxide, although we expect to have further proofs to advance before the subject is exhausted, we shall proceed to examine another of the heaters provided for the purpose in question, and in doing so it will perhaps be advisable to call further attention to the system now so extensively employed for heating water by gas by means of what are very properly named Instantaneous Water Heaters, and of which we gave an example in our last article. When Mr. Maughan introduced his 'Geyser' some few years since, it was looked upon with a certain amount of astonishment, and there is no doubt that manufacturers of gas-burners for baths were for a time baffled in attempting to compete with the rapid action of the newly-invented medium. But the spirit of competition soon found means to overcome the difficulty, and, thanks to the elasticity of the Patent Laws, several manufacturers have been enabled to secure protection for inventions having the same object in view, and arriving at it quite as effectually, though by slightly different modes. To sum up briefly, it may be said that all 'Instantaneous Water Heaters' are based upon the one principle, viz., that of extending the smallest quantity of water for which space is provided over the largest heating surface compatible with the size of the apparatus; and it must be further borne in mind that these apparatus for supplying hot water to baths, are equally applicable for all the requirements of a household, and in large establishments one may be fixed, if necessary, on every floor, obviating the necessity of carrying expensive hot water apparatus throughout a building, supplying hot or cold water from the same tap, as hot water is only produced when the gas is lighted, and cold when it is turned off, and burning mineral oil as effectually as gas where the latter is not obtainable; also securing these advantages at a smaller cost, and with greater convenience to all concerned. Another object gained is, that they can be disconnected and taken away in case of removal, and re-fixed with but trifling expense in another dwelling, while the water passed through most of them is as fit for drinking and all domestic purposes as that supplied by the ordinary tap.

Of such a character is the one invented some three years since by Mr. Hellier, of Duke Street, Grosvenor Square, and which deserves to be more widely known.

No special title has been given to this useful domestic appendage; Instantaneous Water Heater it is called,

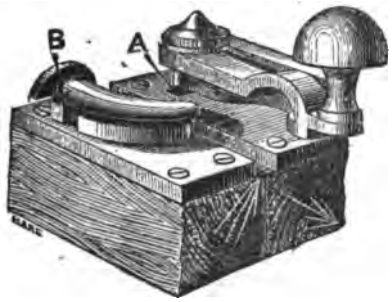
and such it in reality is. It is of the plainest possible character, as will be seen from the engraving appended; use, not ornament, being the object sought to be attained by the patentee. Its action as regards the supply of water to the heater is automatic, a receiver or feed cistern being provided at the top with an ordinary ball valve, so that water is always in the apparatus. This is conveyed to two tapered chambers below, the outer one in part covering the inner one, with a water-way around them. The water passing from the feed cistern down and around the outer one is then conveyed by a pipe to the inner one, up which it travels, when another pipe again brings it to the bottom, where it is connected with three independent coils in the centre of the inner chamber, and again carried to the top, this time to be connected with the draw-off pipe, and once more brought to the bottom, where a tap is provided for the outlet.

It will be readily understood what an extended heating surface is here provided before the water reaches the draw-off tap. The burner, which is an atmospheric one, is ingeniously and safely arranged for lighting, and consists of a great number of jets on cross bars. First travelling up through the three coils, it returns downwards, through the interstice between the heating chambers, and up again around the outside of the upper chamber, striking the cold water cistern twice in its passage, and permeating all round it, before the residue of the heat escapes. In this arrangement the water is constantly travelling to the hottest part of the apparatus, while the gas is reaching the coldest portion of the water. Three quarts are heated to 135 deg. Fahrenheit per minute, which is equal to two gallons per minute at 95 deg., the consumption of gas being at the rate of 25 feet per hour only. The combustion appears to be very perfect, not the slightest smell emanating from the burner in the most confined space, and the residue of heat that escapes being but small, all of which may be attributed to the enlarged area over which it has to travel. A large number of these have been sold, and for a variety of purposes, and appear to have given general satisfaction. Mr. Hellier also informs us that only on one occasion was he requested to supply the apparatus with a flue, and that was for heating a coil in a conservatory, the gentleman to whom it was supplied fearing that his plants might suffer without it. The tubes are all of brazed copper, tinned inside, as the best copper cooking utensils, and the heater, as a whole, is made of the best materials.

(*To be continued.*)

EVERED'S PATENT SECURE SASH-FASTENER.

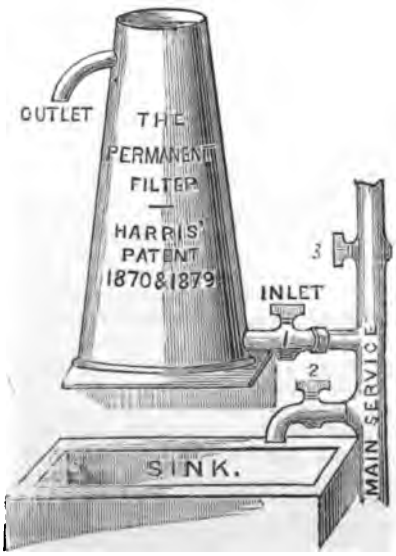
There are few articles of domestic utility to which more attention has been paid, or money expended in the introduction and patenting than sash-fasteners and other inventions for securing windows; and if the patent 'Secure' sash-fastener of Messrs. Evered and Co., Limited, of Drury Lane and Holborn Viaduct, were more widely known, we feel satisfied it would be extensively used, as it can be supplied at about the price of the common one, that offers no security. It is of the most simple yet reliable construction, and secures for the inmates of a dwelling perfect freedom from the inroad of thieves by means of the windows. In appearance, it is similar to a common sash-fastener, but when the arm or lever is brought forward to the notch B, shown in the drawing, it drops into an incision in the catch, and by means of a spring on the back part becomes so securely locked that it is utterly impossible to open it from the outside. It has the further advantage of drawing the sashes closely together, and preventing all noise or rattling, and as the steel spring is entirely exposed to



view, it can be easily oiled or kept clean. To unlock it, the knob has only to be pulled forward, which releases the arm from the slot, and allows it to be thrown back. This fastener possesses all the advantages of the most expensive ones made, and can be purchased at the price of many of the common insecure so-called fasteners.

HARRIS'S PATENT WATER FILTER.

Harris's Patent Water Filter, manufactured by Messrs. W. F. Lotz & Co., Barbican, is intended to be fixed to the main water supply of houses, so as to ensure filtration of the cistern water for family use; it is about fourteen inches high, and may be fixed near to the main tap in the kitchen. Across the diameter of the bottom, and communicating with the inlet, is a sheet of finely perforated, non-corrosive metal rolled up many times, so that the water has to permeate through every one of these innumerable holes in first entering the filter, the whole body of which is filled with finely granulated



charcoal. At the top, and in communication with the outlet pipe, is another roll of the metal before named, and similarly arranged, the water having to pass through this again before its exit. The filtering medium may be altered if necessary; for instance, carferal, or any other mixture, to suit the constituents of different waters, may be substituted. Presuming

that the inlet pipe is always turned on, a constant stream of water continues running, thus any objection to storing water is obviated. Again, the water having to pass upwards and through such a body of filtering medium, the action is not so rapid as in the downward process, although sufficient to give off a constant stream, and more time is consequently given for purifying. To clean the filter, all that is required is to turn off the top tap on the main service, and open the one over the sink, when it will empty itself, and this may be repeated as often as may be considered necessary, and a good flush secured. It will be found very useful on ship-board, owing to the small space it occupies, and its non-breakable character; but will require attention and frequent renewals of the charcoal to maintain its efficiency. It has also the advantage of being so moderate in price as to be within the reach of all classes of householders.

A NEW SYSTEM FOR SOFTENING WATER.

Although the general inconvenience resulting from the use of hard water is well known, few persons have any idea of the saving and comfort which is produced by the substitution of soft water for domestic and other purposes. Messrs. Law and Chatterton have arranged a system by which the various operations for carrying out Dr. Clarke's well known process are successively performed in their required order by simple mechanical means, which are so far automatic that it is only necessary to have the attendance of a person, without any technical skill, for a short time once in each twenty-four hours, or even longer periods; and without the use of any filtering medium, which is objectionable for the following reasons:—1. The filtering material requires periodical cleansing and renewal, which not only occasions much trouble and mess, but is very often insufficiently performed. 2. Experience has shown that the filtering material, whether cloth, charcoal, or other substance, is extremely liable to become 'mouldy' or 'musty', which makes the water both unwholesome and unpalatable.

This system is specially adapted for use in country houses, or other small establishments, there being no operation to perform requiring either technical or mechanical knowledge, or any process producing mess or dirt. The space required for the whole of the tanks and apparatus varies from 8 feet square, to soften 500 gallons per day, to 60 feet square, to soften 50,000 gallons in the same time. For the daily softening of quantities less than 1,000 gallons, the tanks would be of galvanised wrought iron, and the whole apparatus and tanks would be self-contained, so as only to require fixing in place and the necessary connections made with the existing supply and delivery pipes.

Messrs. Law and Chatterton have placed the practical working of their apparatus in the hands of Messrs. Bowes Scott, & Read, engineers, of Broadway Chambers, Westminster, who are now fitting up the system, both on a large scale for works and also at private houses.

A bill requiring all the plumbers of New York and Brooklyn to have their names registered, and also giving the boards of health of the two cities supervision over all new plumbing, has been ordered to a third reading by the Assembly at Albany. This bill is the one drawn up by the New York Sanitary Reform Society.

ILLUSTRATED SANITARY PATENTS.

3206. (1880.) LAVATORIES: B. FINCH, LONDON. [4d.]—The main object of this invention is to dispense entirely with the necessity of making use of the ordinary wood or other enclosure of a lavatory, thus economising space and cost in manufacture and in fixing. The patentee also makes provision in the top to receive supply-valves or cocks, and also drains the soap tray into the receiver beneath. The improvements are equally applicable to lavatories with tip or other patterns of basins, as well as to angle or flat

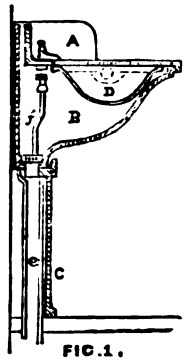


FIG. 1.

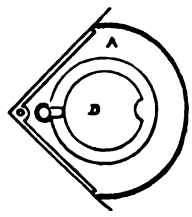
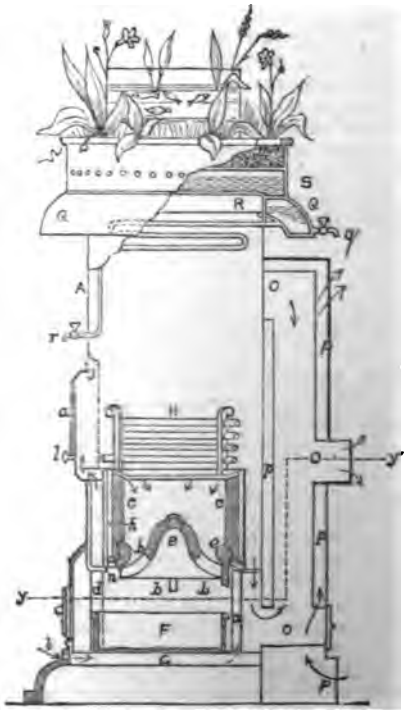


FIG. 2

backed wash basins. Fig. 1 is a sectional elevation, and fig. 2 a plan of the lavatory. A indicates the top slab and skirts of the basin, B the receiver for the waste, C the pilaster supporting the receiver, D the basin, E the waste-pipe, and F the service-pipe to same. The receiver B, for the waste of basin, is so formed that the outlet waste leaves at the bottom, whilst the inlet service-pipes enter at bottom, and pass up to the hot and cold valves in the top slab. It can be fashioned in pottery or any metal.

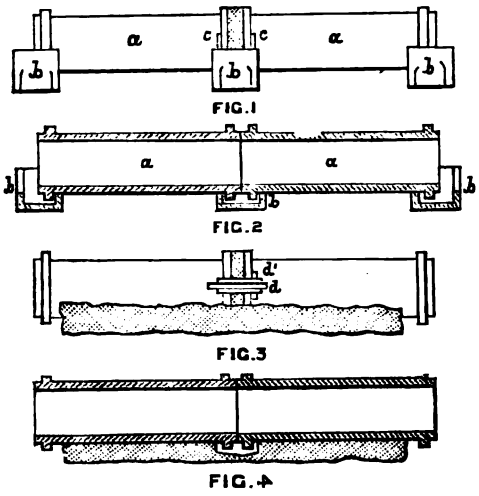
3551. (1880.) IMPROVEMENTS IN HEATING APPARATUS: L. W. LEEDS, WESTMINSTER. [6d.]—This patent consists of improvements on No. 1649 (1879). The



cut represents a side elevation of the stove, principally in section. B is a dome shaped metal grate with an upwardly

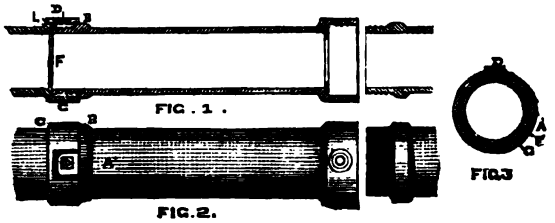
projecting portion for the purpose of preventing the air from passing up through the centre, and for compelling it to pass up at the sides against the fire bricks C, and so toward the illuminating windows '*a*,' which are made of thin sheets of mica set in the metal frames. The grate B is supported on permanent lugs, made to form part of the sides of the fire box. Projecting into the fire chamber D are permanent wedge shaped pieces of metal which, in combination with the moveable grate B, act as crushers for the cinders. The grate when moved backward and forward in a horizontal plane by means of the grate shaker E, leaves alternately enlarged openings, *f*, on either side of the crushers, thus permitting the crushed cinders to fall into the ash box F. Resting on supporting pieces at the sides of the fire box are corrugated fire bricks, the corrugation being next the metal casing, *h*, in order that a hot air passage may be formed from the hollow bottom G to the basket grate H, by means of the air channel, *d*, and the corrugation of the fire bricks. The basket grate may be placed directly upon the top of the fire brick, but it is preferred to rest it upon the turned down portion of the casing, *h*, as shown, as the air from the hollow bottom, after becoming heated by its contact with the fire bricks and the casing, is then deflected upon the sides of the fire, and rises at a still higher temperature along the sides of the basket grate, and then supports increased combustion on the external surface of the mass of burning material, and consequently supplies increased illuminating effects. If the grate be filled with coke, asbestos, or other suitable material, gas may be employed as the heating medium. The fumes from the fire pass out by the pipe O to the chimney, most of the heat they contain being taken up by the air, which circulates around the said pipe within the casing P, which is open to the room. The amount of air admitted to the hollow bottom G is regulated by means of the openings *t*, which may be closed by a slide piece or other suitable device. This arrangement enables a hot fire to be kept up when the perforations are open, and a slow fire otherwise at will. The other peculiar arrangements allow of such a coolness as to sustain fish life on the top of the stove, or to keep earth in a sufficiently suitable temperature to grow plants.

3567. (1880.) JOINTS OF EARTHENWARE PIPES: HENRY DOULTON, LAMBETH. [6d.]— This invention relates to certain improvements in jointing or connecting earthenware pipes. Fig. 1 is an elevation, and Fig. 2 is a longitudinal and vertical section representing flanged pipes laid with chairs. *a*, *a*, are the pipes, and *b*, *b*, are the chairs. In order that the pipes may be rough at the ends, that the cement may adhere well to them, the patentee makes them first with a ring of surplus material surrounding the end. The ring is useful in preserving the end of the pipe from injury, and in preventing warping in the kiln. The ends of the pipes are ground smooth and true after the rings have been broken away. The chairs having been properly laid on concrete or otherwise, the pipes are laid upon them, and the ground ends are drawn into close contact by driving in wooden wedges *c*, *c*, between the flanges of the pipes and of the chairs. The joints have then to be made good with cement; the patentee employs Portland cement, one of cement to three of sand, and mixed so that it will flow pretty freely. This he causes to be poured into the chairs so as to fill up all the space left in their trough like cavities between and around the flanges of the pipes. Before the cement in the chair is quite set, cement is pressed in with a trowel between the flanges on the upper side of the pipes, and so a continuous ring of cement is formed enveloping the ends of the pipes. Before wedging up the pipes in the chairs, it is convenient to insert into the pipes, where the ends meet, a block which can be expanded after the manner of a boot-tree. The block, when inserted, is able to enter the pipes freely, and when having been brought to its place it is expanded, it causes the bores of the two lengths to correspond accurately. By driving in the wedges the pipes are then locked together, and the block is contracted and withdrawn. Figs. 3 and 4 are an elevation and a section representing flanged pipes laid without chairs. In lieu of the chairs a bed of concrete is laid, and upon this the pipes are bedded. Beneath the ends of the pipes, trough-like cavities, corresponding to those of the chairs in Figs. 1 and 2, are cut or formed in the concrete. The ground ends of the pipes are clamped together by means of iron clamps *d* and wooden wedges d^1 driven in. These clamps may also be used when chairs are



employed, their use will permit of smaller chairs being employed than are shown in Figs. 1 and 2. The clamps *d* may be removed after the joints have been made, or if the pipes are likely to be exposed to considerable pressure, they may advantageously be left on. It is advisable to employ the expanding block within the pipes, to set their ends truly together, as already described. The joint shown in Figs. 3 and 4 is made good with cement run into the trough-like cavities of the bed, and laid on between the flanges on the upper side of the pipes in the manner already described. The chairs shewn on Figs. 1 and 2 are also devised of smaller size, and without side flanges. The patent also provides for flangeless pipes laid in chairs or otherwise, so as to compass economy in manufacture and laying.

3626. (1880.) IMPROVEMENTS IN PIPE JOINTS: F. JACKSON, C.E., NOTTINGHAM. [6d.]—This improvement consists in as follows, viz.: to pipes made of clay, earthenware, stoneware, fireclay, or metal, the patentee makes a new form of socket head provided with an opening on one side, and also a new form of spigot end with an annular rim formed upon it, thus allowing the pipes to be put together with a washer of felt or other material, which is interposed between the spigot end of one pipe and the shoulder within the socket end of the other pipe, thus closing the joint between the two pipes, but leaving an annular space between the inside of the socket end of one pipe, and the outer side of the spigot end of the other pipe, which annular space is filled through the opening in the socket head with cement, asphalte, tar, pitch, lead, or equivalent material under pressure, which when set unites the pipes firmly together, and renders the connection air



and water-tight. Fig. 1 represents a longitudinal sectional view of one entire pipe and portions of two other pipes, constructed according to this patent, and Fig. 2 is a plan of the same, whilst Fig. 3 is a cross section of two joined pipes. A represents a pipe constructed according to this improvement; B, a circular band near the spigot end; C,

the socket head; D, D, openings; E, annular space between the spigot and interior of socket, and F, fillet or washer. The inside of the socket end and the outside of the spigot end of each pipe is serrated. When so formed a fillet F of cement, prepared gas tar, or a washer of felt or soft material is placed within the socket end of the pipe. The spigot end of another pipe is then inserted until its band B fits tight inside the socket; a fillet of strong cement or other suitable material is then used to close all openings between the band and the socket; this, and the washer inside the socket end, leaves an annular space between the socket and the spigot, which is watertight, except at the opening at the top of the socket. When the cement or other material has hardened, semi-fluid cement or other material is poured through the opening in the top of the socket until the same is full and flushed up; it is then left to set, and when set unites the pipes so securely as to render the joints watertight.

3654. (1880.) AUTOMATIC FLUSHING APPARATUS FOR DRAINS: B. R. PHILLIPSON, DUBLIN. [2d.]—This invention has for its object the retaining of water in a tank, and discharging the same when a certain quantity has accumulated. It is also applicable to mill ponds and all places where water is stored, and a regulated quantity required to be admitted to the apparatus and discharged therefrom when such quantity has filled it. The apparatus again automatically fills itself. It consists in a valve attached to a lever having a ball at its extremity, and closing or opening the discharge pipe. This lever travels in a slotted standard or pillar. A latch is pivoted to this standard and is furnished with a slot traversing on a pin or *vice versa*. This latch carries an arm or lever, connected to which is a chain or cord attached to a floating ball by a loose chain or cord near or to the top of the tank or receptacle enclosing the whole. Another latch, similar to the one described, but reversed in position, is pivoted on the other side of the slot or opening in the standard, and the lever attached to it carries a floating ball or its equivalent. When the tank is full the ball or float attached to the loose chain floats, pulling on its lever and releasing the first named latch, which allows the valve lever to travel up the slot or opening in the standard by the power of its ball or float, where it is locked and retained by the second named latch, actuated by its float or ball. Thus the valve remains fully open till the contents of the tank are discharged into the drain or other conduit or receptacle. When, however, the water falls below the level of the ball or float of the second named latch it drops, releasing the valve lever and float, which travels down the slot or opening and closes the valve till the tank again fills, during which the valve is held down by the first named latch. When the second named catch releases the valve it is at once permitted to shut suddenly instead of gradually.

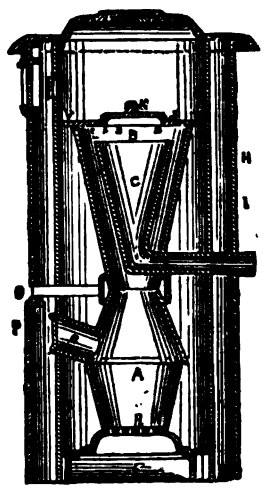
3862. (1880.) VENTILATING APPARATUS: D. GROESBECK, NEW YORK, *per London Agent*. [4d.]—The general principle of circulation adopted in this improved apparatus is the exhaustion from the enclosed space to be ventilated of the foul air contained therein, and the inflow caused by external atmospheric pressure of pure air to take the place of the air so drawn out from said enclosed space. The nature of this invention, which is devised to carry out this principle, consists in adjustable devices, which, placed in certain positions relative to the space to be ventilated, exhaust through the action of external winds or currents the aforesaid foul air, and cause air to be forced in by external atmospheric pressure diffused and freed from mechanical impurities.

3940. (1880.) VENTILATION OF SEWERS AND DRAINS: MESSRS. WALKER, WIGAN, LANCASHIRE. [2d.]—This scheme consists in adapting the system of ventilation used in coal mines to sewers, and diluting the gases with air so as to make them innocuous. At one or more convenient points on the main sewer is placed a large mining fan to draw off the gas and air, and there is arranged at various points along the drains (or sewers) openings, regulated at pleasure, so as to admit air as required. The patentees also provide air traps at intervals, so that, if desirable, the current can be caused to traverse any one portion of the sewerage system instead of the entire system at one time. The person in charge can then, by regulating these adjustable traps, ventilate each portion of the system in succession, and a powerful current of air is caused to traverse every portion of the sewerage at intervals or constantly.

4004. (1880.) WARMING AND HEATING: H. BOXALL, BRISTOL. [2d.]—The heater consists of a portable metallic case, by preference 12 to 14 inches each side, and about 4 inches deep, or so as to be conveniently placed in an ordinary kitchen oven. The heater is placed in the kitchen oven for about one hour; it thus becomes sufficiently heated for use, and will then retain its heat for some hours, and when cooled down may again be heated without cost and with very little labour. No extra fire is wanted to produce the heat. The following are some of its uses:—For warming the feet as a foot stool in cold weather it is invaluable to invalids, as it may be thus used either in the house or for travelling by a carriage or railway; to take the place of hot water bottles for beds, it may be placed in any position required; it is specially useful for invalids affected with rheumatism or other complaints arising from cold; the heater can also be used for airing clothes, beds, and bedding; where a small warmth is required in a sitting or bed room the heater will save the labour of lighting a fire; it can be used to form a Turkish bath either in a chair or in the bed.

AMERICAN PATENTS.

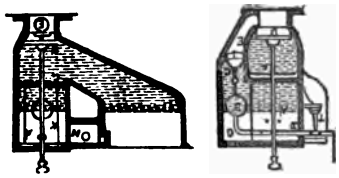
236,891. HEATER FOR CHURCHES: JAMES J. JOHNSTON, COLUMBIANA, OHIO, assignor to himself and A. C. Ellis, Alleghany, Pa. Filed April 12, 1880. (No Model.) Issued January 25, 1881.—*Claim* 1. In the



heater hereinbefore described, the fire-chamber A and the parts B and C, in combination with the air-chamber *f*, inlet tube *g*, and surrounding casings I and H, having air-inlet openings *r* and *s*, substantially as and for the purpose specified. 2. In the hereinbefore-described heater, the fire-chamber A and the parts B and C, in combination with the casing I, forming a chamber divided into two compartments communicating with each other and surrounding with casing H, substantially as herein described, and for the purpose set forth. 3. In the hereinbefore-described heater, the chamber A and the parts B and C, in combination with the casings I H, division-plate *j*, and registers *l* I, arranged, respectively, in top of furnace and said division-plate, substantially as herein described, and for the purpose set forth. 4. In the hereinbefore-described heater, the chamber A and the parts B and C, in combination with the casings I H, plate *j*, and lid *k*, having register I, substantially as herein described, and for the purpose set forth.

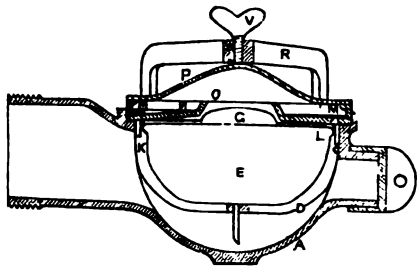
236,905. WATER-CLOSET: CHAS. H. MOORE, YONKERS, N. Y. Filed May 8, 1880. (No model.) Issued

January 25, 1881:—*Claim* 1. The closet-bowl A, the outlet chamber A^1, and the chamber N, located between the bowl and the outlet chamber, all made in one piece, as and for the purpose set forth. 2. The closet-bowl A, the outlet chamber A^1, the overflow-pipe E, and the water-distributing box N, all made in one piece, as and for the purpose set



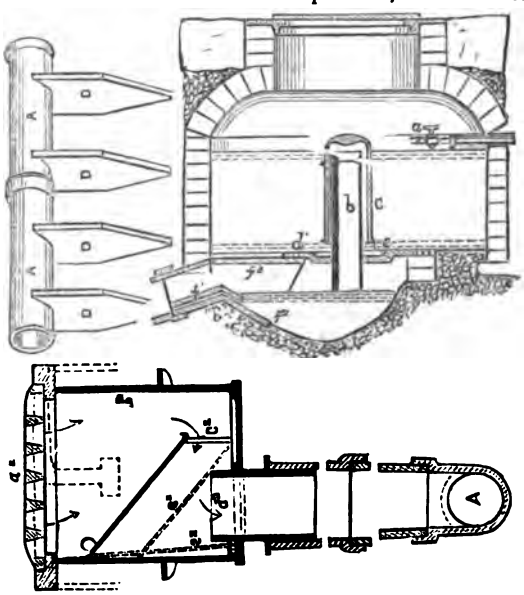
forth. 3. The water-box N, located between and having distributing-outlets into the bowl and the outlet-chamber. 4. A water-receiver connected to the bowl and the outlet-chamber, having an opening for a tube from the supply-valve and distributing outlets into the bowl and the outlet-chamber, as and for the purpose set forth. 5. The water-inlet K in the outlet-chamber A^1, in combination with a water-distributing chamber, as and for the purpose set forth. 6. A valve fitted on the mouth of an overflow discharge-pipe, and adapted to be seated at all times when water is at its regulated height, in combination with a valve-seat having a guide attached to it to conduct the valve to its seat, and a float to open the valve if water increases in the receiver above a certain height. 7. The closet-bowl A, the outlet-chamber A^1, and the chamber N, located between the closet-bowl and the outlet-chamber, and having an opening in the side for a supply-pipe, and an opening, H, in the closet-bowl, substantially as shown. 8. An overflow discharge-pipe having a valve covering the mouth of it, and adapted to be seated at all times when water is at a regulated height, in combination with a valve-seat having a guide attached to it, a spindle attached to the valve and operating in the guide of the valve-seat, and a means for lifting the said valve from its seat when water increases in the receiver above a certain height. 9. In a side-outlet water-closet, a partition placed in the outlet-chamber or receiver above the neck of the bowl, in combination with an inlet into the receiver from the supply-valve and a port leading from the lower part of the receiver to the lower part of the closet, as and for the purpose set forth. 10. A water-closet bowl formed into a square shape at the top by the corners *b b b b* of the bowl, and having but one serviceable outlet. 11. In combination with the float B and lever D, secured to and operating on the support or stand Z, the rod or chain L, as and for the purpose set forth. 12. In a water-closet wherein water is intended to remain at a regulated height, except at times when the closet is purposely empty, and wherein the mechanism is arranged to supply the closet upon the outlet-valve being opened or reseated, an overflow discharge pipe with the mouth submerged, having a valve covering the orifice to form a water-tight joint, and adapted to be seated at all times when water is at a regulated height, in combination with a means provided to lift the valve from its bearing on the seat and permit the escape of any accidental accumulation of water.

237,066. SEWER-TRAP: HENRY TEXTOR, BROOKLYN, N.Y. Filed July 16, 1880. (No model.) Issued Jan. 25, 1881.—*Claim* 1. A sewer-trap for preventing the flow of back-water, made substantially, as herein shown and described, and consisting of a cup-shaped vessel connected with the sewer, and provided with a cup-shaped strainer containing a float, which is pressed up against the lid of the vessel, and closes the aperture in the same, which lid is covered by a strainer, as set forth. 2. The combination, with the vessel A, of the float F, the cup-shaped strainer D, and the lid N, substantially as herein shown and described, and for the purpose set forth. 3. The combination, with the vessel A, of the float F, the lid N, the strainer P, and a device for supporting the float, substantially as herein shown and described, and for the purpose set forth. 4. In a sewer-trap, the combination, with the float F, of the strainers D and P and lid N, substantially as herein shown and described, and for the purpose set forth. 5. The float F, constructed substantially as herein shown and described, with



a central bevelled projection G, fitting against the bevelled sides of the aperture O in the lid N, as set forth.

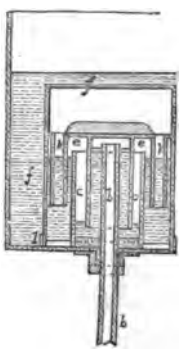
236,740. SEWERING AND DRAINING CITIES: GEORGE E. WARING, JUN., NEWPORT, I. R., assignor to the Drainage Construction Company, Boston, Mass. Filed July 17, 1880. (No model.) Issued Jan. 11, 1881. *Brief.*—Sewer-pipes are smaller than and independent of storm-water system. Soil-drainage is combined with them in the lower and 'filled-in' localities. At the ends of the branches automatic flushing-tanks are arranged. Junction of branch and main are by a tapering section to deliver the sewage to the bottom, and draw the air from the top of the main. House-connections are without traps, and the soil-pipe is run up through the roof for ventilation. Air-inlets, boxed and grated, are arranged at intervals. A swinging section is arranged to deliver the sewage to either of two discharges. Plank-piles pointed at the lower end and notched at the upper end are used to support the pipe in wet, loose soils. —*Claim* 1. The improved system of sewerage herein described, the same consisting in a main sewer-pipe gradually diminishing in size and provided with branches, on the ends of which automatic flush tanks are provided, constructed to



flush the branches and the main sewer, connecting-sewers extending from the sewer-pipe or branches into and through the houses, forming an open flue from the sewer to the top, or practically to the top, of the house, and air-inlets constructed to ventilate the sewers, substantially in the manner as described. 2. The improved system of sewerage and drainage, the same consisting in the combination, with a system of sewer-pipes and branches constructed to discharge the sewage independent of the storm-water, as described, of a system of subsoil drains laid in the same trench with the sewer-pipe, as and for the purpose set forth. 3. The com-

bination, with the main sewer-pipes, of the branch pipes made at their junction of the same size as the main pipes, so as to discharge the liquid on a line with the bottom and withdraw the air on a line with the top of the pipe, as and for the purpose set forth. 4. The combination, with air-inlets to a system of sewers, of a house-drain connected with the sewer by a connection practically of the same height as the sewer, extend to and through the house, constructed to ventilate the sewer, as and for the purpose described. 5. The combination, with a system of sewer-pipes constructed to discharge the sewage independent of the storm-water, of flush-tanks located at the heads of the branches, air-inlets and house connections extending through to the house-top, without traps between the house and the sewer, constructed to clean the sewer-pipes by the rush of water from the flush-tanks, and ventilate the same by currents of air passing in by the air-inlet and out by the unobstructed house connections, as described. 6. The improvement in the construction of flush-tanks, the same consisting in providing the pipe b^1 with the flange e^1, the plate d^1, constructed to receive the flange, and the syphen f^1, cast in one piece with the outlet, as described. 7. In combination with the system of sewerage, as described, the box b^2, provided with the grated or open cover, a^2, the grate c^2, and the cover e^2, constructed to operate as described. 8. In the herein-described system of sewerage, the combination, with a pipe, of the piles D, having their lower ends pointed and their upper ends respectively provided with recesses in which the pipe rests, substantially as set forth. 9. The combination, with a system of sewers constructed to discharge the sewage independent of the storm-water, of the tube b^3, pivotally connected in the concave collar or ring a^3, and constructed to change the direction of the outflow of the sewage, as described. 10. A Y branch-pipe A and the conical branch A^1, the interior of which is practically on a line with the top and bottom of the main pipe, as described. 11. The improved joint for drain-pipes, the same consisting in a strip of paper or similar material wrapped around the pipe at the joint, as described.

237,187. AUTOMATIC FLUSHING-CISTERN FOR WATER-CLOSETS: JAMES P. HYDE, NEW YORK. Filed April 5, 1880. (No model.) Issued Feb. 1, 1881.—*Claim.*—The combination, in an automatic flushing-cistern to which water is supplied gradually, of the pipe *b*, leading to the closet or other article to be flushed, the fixed cylinder *c*,



surrounding said pipe *b*, the pendent cylinder *e*, the cap *f*, surrounding the cylinder *c*, and having an air-chamber therein, the tubes *n* or *h*, that open at their upper end into the otherwise-confined air-space within the cap *f*, and the supports *l* for the cap *f*, substantially as and for the purposes set forth.

In presenting his quarterly report, Mr. Allen, the Sheffield Borough Analyst, states that of samples of cayenne pepper submitted to him for analysis, one was found to be adulterated with about 6 per cent. of its weight of red lead. It is Mr. Allen's opinion that pepper so adulterated would be likely to prove injurious to health.

NOTICES OF MEETINGS.

THE METEOROLOGICAL SOCIETY.

The usual monthly meeting of this Society was held on Wednesday the 20th ult., at the Institution of Civil Engineers, Mr. C. Greaves, F.G.S., Vice-President, in the Chair. W. H. Goss, F.G.S., and Admiral T. L. Massie, were balloted for and duly elected Fellows of this Society. The following papers were read: 1. 'On the Frequency and Duration of Rain,' by Dr. Wladimir Köppen of Hamburg; 2. 'Results of Experiments made at the Kew Observatory with Bogen's and George's Barometers,' by G. M. Whipple, B.Sc., F.R.A.S.; 3. 'On a Discussion of Mr. Eaton's Table of the Barometric Height at London with regard to Periodicity,' by G. M. Whipple, B.Sc., F.R.A.S.

NATIONAL HEALTH SOCIETY.

A course of six practical lectures, specially addressed to working plumbers, and illustrated by examples, diagrams, and working models and demonstrations on 'the Science and Art of Sanitary Plumbing', will be given, at the request of the National Health Society, by S. Stevens Hellyer, Esq., author of *The Plumber and Sanitary Houses*, at the Rooms of the Society of Arts, John Street, Adelphi, by kind permission of the Council, on the following dates: May 17; June 1, 14, and 28; July 12 and 28. To commence each evening at 7.30.

Syllabus of the Course.—May 17, Lecture I, Introductory. Unsanitary plumbing; force of prejudice; importance of knowledge of principles; who should call themselves plumbers? need of a school of plumbing.—June 1, Lecture II, Joints and Pipe-Bending. Wiped Soldered Joints: Underhand, upright, branch, block, flange, taft. Copper-Bit Joints: Float, ribbon, overcast, blow-pipe joints, pipe-bending.—June 14, Lecture III, Traps and Trap-Ventilation. The necessity of traps proved by practical experiments; traps which form themselves into collecting-boxes or cesspools; self-cleansing traps; trap-syphonage; trap ventilation.—June 28, Lecture IV, House-Drainage and Ventilation. Soil-pipes; general waste pipes; cistern wastes; safe wastes; connections of branch-pipes with main pipes, etc.; value of good water flushing, etc.—July 12, Lecture V, House-Drainage and Ventilation. Disconnection of soil-pipes and waste-pipes from drains, and of drains from sewers and cesspools; ventilation of soil-pipes, waste-pipes and drains; summing up.—July 28, Lecture VI, The Art of Lead-Laying. These lectures will be illustrated by practical experiments and large diagrams.

At the close of the course the following prizes will be awarded: Duke of Westminster's prize, £5; National Health Society's prize, £5; Mr. Ernest Turner's silver medal; and several bronze medals. Certificates will be awarded to all those who show their proficiency. Free tickets and all particulars to be obtained on application at the offices of the National Health Society, 44, Berners Street, W., and at the office of the SANITARY RECORD 15, Waterloo Place, S.W.

Mrs. Johnstone, Superintendent of the Hastings' Sanitary Aid Association, will deliver a Lecture on 'The Prevention of the Spread of Fevers', with account of ten years' experience in the Provinces, at 13, Lowndes Square, S.W., by permission of Mrs. Lawrence Cave, on Monday, the 23rd May, at 5 o'clock.

ORIGINAL PAPERS.

DRESS REFORM.

By E. M. King,
Hon. Secretary of the Rational Dress Society.

From the response we have received to the notices of the Rational Dress Society, which the press has so kindly given us, we may take it for granted that a great number of English women heartily desire a dress reform. That they are disgusted with the folly, or worse than folly, of the fashions they see around them, and are anxious to make a stand against them, so that they may not be forced into adopting them, often at the sacrifice of health, comfort, and good taste, and a waste of time and money which might be devoted to better purposes.

Individual effort can do little or nothing against the tyranny of fashion. Those who are in society must conform to the ways of society, or be isolated and cut off from it; and to be isolated, or to withdraw from society, is to abandon all idea of influencing it.

Fashion is not the result of an individual's will, though in its initiatory stages it may take its 'set' from some noted, or rather notorious, person or persons. The full tide of fashion which sweeps over a country carrying all before it, is the combined result of many powerful influences. There is the commercial interest, and the manufacturing interest, with their head and hand workers to keep employed. There is the trade interest, with its innumerable shops and shop people, designers, fitters, and workers to be maintained. All these have, or think they have, to make their fortunes out of two weaknesses of our nature, which at present amount almost to vices, namely love of show and love of change. We have, therefore, fashion made strong and powerful by feeding on certain weaknesses of our nature, and these weaknesses fed, encouraged, and stimulated by fashion. Here we have a vicious system of action and reaction constantly tending to increase and intensify the evils we deplore. There is but one remedy for this, and that is in the establishment of a combination sufficiently powerful to check and reverse this acting and reacting process.

In order to effect this we must first of all have knowledge. We must follow the advice which the gentlemen have kindly had carved for us on the chimney-piece of the refreshment-room attached to the Ladies' Gallery of the House of Commons, we must 'Get understanding.' The people who are working to force certain goods and styles of dress upon us do so with a sublime disregard of the health of the bodies which their goods, produced with so much toil and labour, are intended to cover. While those who are nearer to us—our dressmakers, milliners, boot and shoe-makers, underclothing-makers, etc.—with a yet blinder ignorance, or wilful disregard for all that health demands, make victims of us to increase their gains. This again is met by an equal amount of ignorance and disregard for health on the part of the female public who are to be clothed.

It should, therefore, be the first duty of the members of a Rational Dress Society to endeavour to gain, both by scientific study and from personal observation, an adequate knowledge of the matter they take in hand. To learn how health is affected by dress, and what materials, textures, colours, and shapes of garments are most conducive to health; and acting on this knowledge, to try and introduce, as widely as possible, costumes in conformity with it, and designed by people of taste and education. Dressmakers and milliners, etc., may be as well employed in carrying out these designs as in devising monstrosities, and surely it is more fitting that ladies should give orders to tradespeople than that they should obey their mandates as to what they should wear. And if any section of the public required and steadily demanded a healthy style of dress, the trade would soon respond to the call; and this would still further tend to educate the public and those who cater for them.

The second aim of the members of a Rational Dress Society should be to gain themselves and impart to others true ideas of the beauty of the female form, instead of the deformed shape which fashion has so long presented to us. Until the vicious taste which fashion has engendered has died out, we should resort to the natural and the useful upon which to model our garments, leaving beauty to follow from these, rather than attempting the so-called artistic, which as yet has no sufficient foundation in correct knowledge upon which to base itself. If the simple rule is adhered to, that dress is to follow the lines of the body, the figure will no longer be squeezed in in one part and unduly extended or inflated in another, nor women made to look like stuffed dolls, tottering and hobbling under clothes which distort them, and in which they can hardly move, bend, or even breathe!

One radical mistake we make with regard to modern

1. Top trimmed skirt. 2. Under-skirt. 3. Divided skirt.

dress is to look upon it as an affair of drapery. Let us keep drapery for bed and window curtains, to cover statues, or lay figures, but for the dress of

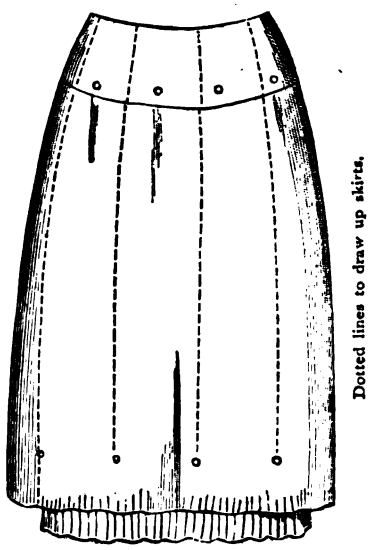
women in the crowded bustling life of the nineteenth century, it is totally out of place. We want to be clothed not draped. The idea of beauty, therefore, derived from flowing drapery (and this seems to be the chief one of the so-called æsthetic school) is of no use to us, as not applicable to modern daily life. Whenever we think of the beautiful with regard to dress we immediately recur to the ancient Greek models, and to the drapery which looks so grand and graceful on the Greek statues; but we forget that when the Greeks engaged in active exercise their draperies were thrown aside. Any one visiting our Australian colonies may see many a handsome native draped in his blanket or beautiful flax mat, but when at work, especially at a distance from European settlements, a very small amount of drapery is retained. Ornamental drapery is suitable to a bygone age, or for a savage life, but for modern life it is out of place, because civilized society does not permit the throwing off of superfluous garments at pleasure.

Modern dress must learn to gain what beauty it can without the aid of superfluous drapery; from the beauty of the form it covers, from its graceful movements, and by discarding the false and hideous outline which fashion would give it. We must also put aside, at least for the present, the idea that art can improve nature, for this we must wait until we have obtained a more correct knowledge of the 'nature' we have to improve. If not, the result will be what it always has been, the deforming and caricaturing of the figure rather than its improvement. We are even now threatened with the re-introduction of a specimen of this false taste. Crinolines are to be worn again for the double purpose of 'improving nature', by setting a hump on the middle of a woman's back, and of making her carry about a frame over which to hang 'drapery'.

It is all very well for some sensible women to dress as they please and declare they are perfectly free and comfortable, and that what they do other women can do, without the aid of a society to help them. The dingy and unattractive garments most of these ladies wear will not be adopted by young girls. But it is the young girl growing into womanhood whom fashion most injures. By the tight steeled and boned stays, by the heavy dragging draperies, the organs of the body are forced out of their natural positions, and they and the muscles are never properly developed. Circulation is impeded, healthy exercise rendered almost impossible, and injuries done and malformations produced which are felt throughout the whole of the woman's after life—and not during her own life only, but entailed upon her children after her.

For the illustrations, it must be remembered that they are but first attempts to carry out our ideas, and that even if we had planned a perfect model, it would not be adopted. We could only introduce it by degrees, as we have no desire to startle society or shock conventional propriety by sudden innovations. The divided skirt underneath covers the body evenly, each leg being suitably and decently covered; the outline of the figure is followed, in so far that no puffings or compressions are introduced, and no greater amount of drapery is given than for the present is necessary. In the house the upper-trimmed skirt might be laid aside or the lower one drawn up.

To conclude. The Society is at present but newly formed, and any remarks or suggestions as to health, utility, beauty of form, or elegance of design are sincerely desired from those who may interest themselves on the subject. The wider the scope of the reform needed the greater should be our effort to give the whole subject a sound and earnest consideration. We claim the right to resist extravagance and the arbitrary imposition of foreign fashions, to wear what garments we find best suited to our means, our needs, and our work in life, and are generally most conducive to our health and happiness.



The divided and under-skirts supported by a broad band round the hips—not hanging from either shoulders or hips.

THE USE OF ALCOHOL IN RELATION TO PUBLIC HEALTH.

By LEWIS SHAPTER, M.D. Cantab.,
Physician to the Devon and Exeter Hospital, and to the West of England Institution for the Deaf and Dumb.

ONE of the vexed questions of the day, bearing prominently upon the preservation of public health, is undoubtedly the popular use, and consequent abuse, of alcoholic stimulants. That the widespread abuse of alcohol has developed into a national danger is a proposition scarcely open to question; but it must at the same time be admitted that we have not yet arrived at a remedial measure of prevention and cure for this abuse which can be rendered generally acceptable, either from a scientific or a logical point of view. Medical men have, for example, very generally held aloof from entering upon the controversy upon which the admission of this abuse inevitably leads them, because, in all probability, as the cautious and logical advisers for the public welfare, they have not seen their way to propound total abstinence or any doctrine of totalism as a remedial measure for what of moderation or intemperance; and because, moreover, to adopt total abstinence from alcohol is to throw over a remedial agent which may be not only curative but preventive of disease. Whereas, therefore, on the one hand, medical men should not shrink from grappling with a national evil prejudicial to health and boldly offering measures remedial and preventive, yet, upon the other hand, it becomes them to act with such extreme circumspection as shall render their views clear and reasonable for the present as well as fruitful for the future.

The question which underlies the whole matter is

the popular use of alcohol appears to be this: Is there a general necessity for the use of some restorative beverage; and, if so, does alcohol fulfil the requirement with safety and efficiency? If it does not, and the necessity remains, we must clearly look for a substitute; but if it does we have only to deal with its abuse, and not its acceptation.

Medically speaking, the chief remedial use of alcohol is as a food, and as a present stimulant to a circulation which without its temporary aid might disastrously fail. As a food there is probably no other substance which can effectually perform the same functions. In typhoid fever for example, a fever of protracted, but limited duration, where the vital functions tend proportionately to fail and endanger the power of resistance until the close, alcohol may confidently be looked to as the most readily assimilated food, and the most effectual temporary stimulant.

Like other kinds of heat-giving foods, alcohol undergoes oxidation within the body, and in yielding up its carbon and hydrogen, it induces the development of heat, and proportionately diminishes tissue waste and checks the necessity for other kinds of food. The other action of alcohol is that it excites the vascular system and stimulates for present purposes a failing circulation so as to carry it through the limited duration of the attack, but like all indirect excitants to the nervous system it subsequently depresses. The necessity for the stimulating action of alcohol to the vascular system arises more especially towards the close of a prolonged acute illness like typhoid fever; but prior to this period, so long as the assimilative and digestive functions continue in comparative vigour and there are no indications of failing circulatory power, nitrogenous food rather than stimulants will more confidently be looked to, and alcohol as heat-giving food will be only justified, either in small quantities as an adjunct to other food, or as a means of preventing over-taxation of digestive functions. The same form of reasoning will also show itself in the use of alcohol in other ailments of a minor character where it is remedial in its action. In some cases where a sluggish circulation is a prominent feature or primary cause of existing disease, the use of alcohol as a stimulant is undoubtedly advisable, and failing it, we probably have recourse to other medicinal agents to induce similar ends, such as spirits of ether, sal volatile, or carbonate of ammonia. In some cases of feeble digestion again alcohol is prescribed with a view of stimulating the mucous membrane and the digestive functions dormant from atony or want of vital activity: beyond, however, a stimulating action on the peripheral vessels supplying the coats of the stomach, alcohol has probably no therapeutic position in improving digestion—rather the contrary. Many articles of food are rendered less soluble, and therefore more indigestible, by the presence of alcohol, and much will therefore depend in cases of this kind as to the time prescribed for taking the alcohol medicinally; if taken before meals, it tends to become absorbed more readily, and to act more surely as a local stimulant and tonic to an enfeebled stomach; but if taken with a meal, its mechanical effects on food might prove as deleterious as the effect of increasing blood-flow by local stimulation proves beneficial. Other cases occur, again, where alcohol is advisably used dietetically as an adjunct to food with a view of preventing over-feeding; this especially occurs in those given to much mental labour, and if alcohol is not taken in moderation there is a tendency to a greater consumption of animal food and heat-giving food, such as starch and sugar, than can be deemed beneficial or advisable.

All this is the medical aspect of the question, and although it will be seen that to the mind of the practical physician it is a matter almost beyond dispute that the oxidation of alcohol within the system can effectually take the place of food and the wasteful combustion of tissue elements, and so become a preservative of vital force in its action as a respiratory food; so, again it must be observed has this same fact its bearing upon our practical treatment of diseases which are more or less chronic—for here the readiness with which alcohol becomes a heat-giving food may become a source of danger; and in health, as well as in a class of diseases associated with fulness of system, the use of alcohol as a stimulant, local or general, has to be balanced against the impediment its introduction will of necessity offer to the elimination of the less readily oxidisable materials taken in as food or already stored up within the body as overplus or waste, and which may be the hidden cause of disease.

There are yet two more points which should not be lost sight of, as influencing to a certain extent the medical use of alcohol: (1) the fact that alcohol is very generally used in the form of compound liquors pretending to special therapeutic properties, such, for example, as rum and gin, and (2) that it forms a constituent at least of drinks such as wine and beer which are often described as nutritious. With respect to the derivative properties ascribed to rum and gin, it is only right to assert that these can be obtained with a greater degree of certainty with remedies less complex and more certain in their composition; and consequently, were the use of alcohol in any way to depend upon results attributable to these compound spirits, they can be at once safely discarded without any loss to our remedial resources. The remaining question, however, as to whether wine can properly be considered nutritious in its character, will in all probability continue to remain a much more vexed one. This is in a great measure due to the fact that many who will willingly give up the use of brandy, whiskey, or similar direct alcoholic liquors, will, nevertheless, be slow to acknowledge that harm is likely to follow in the wake of the moderate use of the more luscious and agreeable wines—it would be yielding up without sufficient cause as great a luxury as the occasional cigar, because forsooth on the same line of reasoning, smoking to excess is deleterious; and as to the stomach, which, at the close of the daily avocations partakes in the general fatigue and exhaustion, shall a glass of good generous wine be denied it to enable it more efficiently to perform its digestive functions because the immoderate use it to excess?

Wines consist, properly speaking, of the fermented juice of the grape, and their composition may strictly speaking be said to be: Alcohol varying in quantity from 18 to 30 per cent. of proof spirit, grape sugar, bitartrate of potass, tartrates of lime, aluminium and iron, phosphate of aluminium, chlorides of sodium and tannin, essential oils which give flavour, and œnanthic ethers which give aroma. When perfectly fermented and free from unconverted sugar, wines are termed 'dry'. In many wines where sugar is in excess, such, for example, as Sauterne, the production of alcohol, after a certain point, preserves the wine and arrests the fermentation, a certain amount of unconverted sugar being left to add to the sweetness of the wine. With the same

end in view, spirit is often added artificially to wines as a preservative against further fermentation, and in order to produce a required richness and fulness of flavour for the market. This is very generally done in the manufacture of port and sherry, and the red Tarragona wine of Spain. Other wines, such as the tent wine of Spain, are not fermented at all, the grape juice being simply concentrated into a syrup by simmering; but, in this instance, there are really no vinous or alcoholic properties. Effervescing or sparkling wines are partially fermented, the fermentative action being checked at a certain point to preserve the requisite degree of sweetness or dryness. The acid flavour of wine, mostly found in clarets or Carlowitz, ought to be due to the malates or tartrates as normal constituents, and acidity in natural wines ought neither to be marked nor excessive; but very generally marked acidity is due to the presence of acetic acid. The colour of wine is of very little practical importance; it is, of course, obtained normally from the skin of the grape, the bruised fruit being fermented instead of the expressed juice, but more commonly, as in sherries, the colour is an artificial production, for which reason alone pale sherries are often preferred to brown or golden.

These few remarks on the composition and treatment of wines are intended to show that, as the natural products of the grape and vine, wines have much to recommend them, and might very harmlessly remain as agreeable adjuncts to the table and as useful medicines; but, unfortunately for the proper estimate of such an important question, we have to consider so generally the artificial manufacture, and doctoring, and adulteration of wines, that their properties become so changeable and variable as to stand neither the requirements of the medical adviser in search for a wholesome remedy, nor those of the guarded epicure in search for an adjunct to the table. Surely the medical man who finds sherries and hocks markedly medicinal in their effect; ports and sherries, so strongly alcoholised as to be scarcely inferior in strength to brandy and Clarets, Bordeaux and Marsalas full of crude acidity; will have his confidence, in recommending natural wines, sorely shaken; and what shall be said, too, of the epicure or consumer for pleasure's sake? Will it be pretended that the flavouring called 'dry', which has been found in sherries, champagnes, hocks, and most other wines, has been a natural production, and, if so, how comes it that, when the taste has a little changed, the same class of wines suddenly appear again with sweetness, fruitiness, and body? If it be the fact that we are dealing with the art of the manufacturer to cope with the fashion of the day, and not with wine as a natural production only in different states of natural maturity and fermentation, can it be expected that it will hold its place either as a remedial agent or otherwise.

In whatever way, indeed, we look at the question of the modern use of alcoholic drinks, we shall probably admit that it comes back to this, that alcohol in all the shapes and forms that it is presented to the public must be looked at, popularly speaking, as a stimulant alone; and the question arises, is there a general requirement for a stimulant, and if so, should alcohol in any of its shapes or forms be used? Medically speaking we have already seen, that alcohol, as a stimulant is a valuable aid to our resources, and admitting this, it must also be remembered that the public are very much their own physicians in the majority of minor ailments, and whether rightly or wrongly they adopt their own remedial measures. Instead, for example, of submitting to being bled once a month as of yore, the seeker after health prefers to purge himself once or twice a week with quack pills, and instead of taking wine in moderation it has suddenly become more reasonable to load the system with saccharated iron and phosphorus drinks; the most potent medicines too of the *British Pharmacopœia* are everywhere vended, under the title of patent medicines, by grocers and co-operative stores, just in the same way as a pound of sugar or some spice or condiment is vended. The most remarkable feature. however, of the popular use of powerful drugs, is certainly the fact that temperance and even scientific teachers have found it reasonable to rush violently into the untempered use of iron and phosphorus with the view of curing the abuses of such a thing as alcohol. If, however, it shows anything, it shows that there is a physiological demand for something else but water for the system even amongst teetotalers. The teachers of temperance would surely do well to reconsider their position as public advisers, and, rather than decry generally the use of alcohol as an obnoxious thing, admit once and for all that there is a national danger to be met, and join with the body of medical sanitary reformers and all logical thinkers in promulgating in detail, such remedial measures as affirm—1. That the body in health requires no stimulant; 2. That alcohol is essentially a direct stimulant to the circulation, and, therefore, is not required; 3. That the study of alcohol, as a medicinal agent, shows it to be a remedy of varied power and use, according to the conditions for which it is used; and, 4. That alcohol, in conjunction with the mass of patent medicines now in use, should be classed as poisons to systems that do not require them.

The last three questions have already received consideration adequate to the scope of this paper; but, as to the first, let us briefly consider its bearing upon the tendencies of the time and progress of the age.

We are living in an age when mental power is rapidly supplanting the necessities for manual labour. In agricultural pursuits the devices of machinery are predominant, and that part of the population which gains its livelihood by sedentary occupations in banks, counting-houses, and other offices, is largely on the increase—everywhere education is telling its tale, and is gradually tending to uplift all the working classes of the community in the social scale at the same time as it is tending to make subordination comparatively scarce. Education also carries with it its results amongst the higher classes. The young man and growing youth is made the victim of competitive examinations, which in other words, may be rendered as 'feats of memory'; cramming literally everything into the growing brain at high pressure, is the system at our schools; and the test of highest capacity for our public services and learned professions is capacity of memory. The professional man again, in the midst of busy pursuits, must in spare hours keep apace with the growing literature of the day; and as to the female part of the population, it is even lusting after the highest resources of mental labour with all its anxieties, instead of being satisfied with the improvement of the mind to a requisite degree, and the subsequent position of being a true helpmate for the man, and the builder up and stamp so to speak of the coming generation. All this tells us that the tendency of the day is to work the brain at high

pressure, and to look to the artificial manufacture of memories, and the individual store of book-knowledge, rather than to the practical resources of a mind properly instructed in the rudiments, but built up into power by the practical resources of the individual and the characteristic marks of self education. All this tells us also that if the tendency of the day is to overwork and weary or exhaust the brain and nervous system, there is dietetically an abiding need for a restorative agent which will entail no work on the digestive functions. To offer, however, a temporary stimulus to the circulation with alcohol, when we ought to be invigorating calming and sustaining, is not only adding fuel to the flame and inducing nervous depression instead of vigour, but it is also in its continuance most assuredly sowing the seeds of disorder which may end in disease. Alcohol, in stimulating the circulation and promoting a sudden rush of more nutrient material to the brain and nervous system, supplies it, may be, with a temporary means of support for further work, but the agent is a delusive one; there is no manufacture of fresh nutrient material to supply demand; and that wearied brain shall yet become more exhausted just in the same way as those blood-vessels, the simple carriers of nutrient material, for a time stimulated to overwork, shall become correspondingly exhausted with the temporary degree of undue vigour so unwisely imposed upon them.

Let us remember too that in speaking of the normal circulation of the blood, we have to view something more than a mere mechanical force-pump represented by the heart, and a system of elastic and muscular carrying tubes represented by the vessels. The nervous system is a most important factor in both central and peripheral circulation, and may very properly be considered the controller, regulator, and co-ordinator of all, making uniformity and regularity where in disordered conditions of the nervous system we find irregularity and want of uniformity, and insuring the due supply of nutrient material requisite for healthy function, where otherwise there would be want. Both nervous exhaustion and failure of circulatory vigour, whether arterial or cardiac, may therefore have to be met by restoratives or tonics to the nervous system. The constant repetition of food is unwise, because it makes too great a demand upon digestive functions and consequently tends to weaken them; we have, therefore, medically speaking to recommend (1) regularity of meals, or food at regular intervals to admit of complete digestion before more food is taken; and (2) a nervine tonic or restorative, to support a wearying nervous system, and not a stimulant to force the heart and vessels to overwork themselves.

Now, the only restoratives to the nervous system which have stood the test of time, popular acceptation, and practical usefulness, are infusions of tea and coffee and such like beverages. It needs no medical knowledge to speak of the increased sense of respiratory power and muscular vigour; the promotion of general comfort and warmth; the cooling of the body, the result of the slight increase of perspiratory functions; and the general restorative feeling when the body is overcome with fatigue, which is so generally and justly attributed to the use of tea, or, as will be presently shown, its active principle, theine, in the daily experiences of life.

Failing however popular acknowledgment, medical and scientific research point to one and the same conclusion, that infusions of tea and coffee are restoratives to the nervous system, and indirectly act as sustainers to the circulation. Chemistry has shown that this action is dependent, not upon the multiple constituents of the infusion of the leaf and berry, not upon any complex association of materials, but simply and entirely upon the presence of one substance—theine—which is the active and essential principle of all these and allied substances, and is known to us in the form of silky prismatic crystals soluble in water. The quality of tea or coffee is, therefore, properly determined by the percentage of theine it contains, which varies from three to six per cent., and not by the delicacy and fulness of flavour which is imparted by the volatile oil. Medically speaking, this theine has a totally distinctive action, from the infusions of which it forms a part. In the form of an infusion of tea or coffee, we have to deal with a large proportion of astringent matter in the form of tannic acid, and with the presence of the essential oil which is an excitant to the nervous system, and is the substance to which must be ascribed disorders of the nervous system which result from tea drinking, such as palpitation of the heart and sleeplessness. The theine, upon the other hand, of which there is about one-tenth of a grain in an ordinary cup of tea, is the restorative agent to the nervous system, and is opposed in its therapeutic properties to the action of the essential oil. The infusion therefore of tea may induce palpitation in a heart liable to excessive or inco-ordinate action; but theine on the contrary may be looked to, therapeutically, to quiet palpitation. The infusion by being an excitant may prevent sleep; theine, by being a restorative and an indirect sustainer and regulator of the circulation, may induce sleep. Individual medical investigators have more than this attempted from time to time to show that the action of theine is allied to that of quinine, because in medicinal doses the one has proved as curative as the other in allied diseases; and, moreover, that the nutritive value of theine may bear comparison with that of kreatine, one of the principles of meat.

All this is sufficient to show that theine is already a tried and proved agent, with a recognised dietetic position; and, if it has not hitherto occupied a place supplanting the abuse of alcohol, it is because (1) it has remained unrecognised as the active and essential principle upon which all the good qualities of tea and coffee as restorative beverages really depend, and (2) it has not been presented to the public in a form which would tend to render it acceptable or agreeable. In the form of an aërated water theine offers the means of supplanting the abuse of alcohol. It forms an agreeable beverage, imparting a somewhat dry flavour to a distilled water, which may be sweetened and flavoured to taste, and it offers a means for awakening scientific thought to the study of a simple remedy for a national abuse.

A table recently issued by the Registrar-General gives the number of marriages in England in 1880 as 191,634; of births, 880,520 (448,254 males having been born, and 432,266 females); and of deaths, 528,056 (273,321 males having died, and 254,735 females). The numbers in the various quarters of the year stand thus: Marriages — First quarter, 41,202; second, 41,851; third, 47,662; fourth, 36,919. Births — First quarter, 221,605; second, 232,506; third, 218,766; fourth, 207,643. Deaths—First quarter, 145,704; second, 125,196; third, 131,030; fourth, 126,126. The estimated total population of England in the year was 25,480,161.

THE SCIENCE AND ART OF SANITARY PLUMBING.

ABSTRACT OF LECTURES DELIVERED FOR

THE NATIONAL HEALTH SOCIETY,

BY S. STEVENS HELLYER, ESQ.,

At the Society of Arts.

I.—PLUMBERS AND PLUMBING.

THE first of a course of six practical lectures, specially addressed to working plumbers, on the Science and Art of Sanitary Plumbing, was given by Mr. S. Stevens Hellyer, by the request of the National Health Society, at the Society of Arts, on Tuesday, May 17th.

Mr. ERNEST TURNER, F.R.I.B.A., took the Chair, and said the large attendance of plumbers showed him how anxious they were to obtain knowledge, and to do their work well. Having regard to the advances which were being made in sanitary science, and to the discoveries of medical men that many serious illnesses were caused by the admission of sewer air and noxious gases into our houses, through drains, waste-pipes, and appliances improperly planned and constructed, it was thought it would be of great service to the public, and to the plumbing trade, if the latter were to be afforded free opportunities of becoming acquainted with the leading principles which should guide them in planning and executing their work, and that those who availed themselves of these opportunities, and proved their skill, should receive some recognition, which might always be of service to them. For this purpose they gladly availed themselves of the services of Mr. Stevens Hellyer, who was so well known to all of them as a head and hand worker. At the conclusion of the course an examination would be held, which it was proposed should be conducted by a committee of practical plumbers, and Mr. George Shaw had kindly consented to act as chairman of that committee if they wished. The following would be the prizes awarded: The Duke of Westminster's prize, £5; National Health Society, £5; The Society of Arts' medal; Mr. Ernest Turner's silver medal; and several bronze medals.

Mr. HELLYER said he would advance no theory which would not square with practice, and should prove his theories to be correct by some practical experiments. It should be borne in mind that in these lectures he (the lecturer) was thinking and speaking of the general working plumber, but he had in his mind's eye the master plumber, who was both master and man, as he wished what he had to say to be of service to all who called themselves plumbers. Unfortunately, plumbers were difficult to move when once they had taken up a position; there was a tendency among them to continue in the same groove as their grandfathers.

'Schemes might come and schemes might go,
But they stand fast for ever.'

There were, unfortunately, too many who continued to support the practice of connecting waste-pipes, sinks, and lavatories, with soil-pipes, without any attempt to prevent the gas from the latter entering the former; and this, not only in old houses, but in new dwellings that had not yet been occupied; plumbers were indeed willing to dwell in Sleepy Hollow. Sanitary reformers were rightly severe upon the trade for continuing to plod on in the old paths, although men of light and leading were moving along the new sanitary way, with their lamps well lit with truth.

The British workman was no favourite with the public, and he feared the plumber was no exception to the rule. Shakespeare had struck him a very hard blow, although Bacon spoke kindly of the 'goodly leads upon a three-story tower'. But there were plumbers and plumbers, and just as it would be unfair to judge doctors by quacks, so was it unjust to judge plumbers by tinkers. The trade was injured by a class of men who assumed to be plumbers, painters, glaziers, paper-hangers, bell-hangers, and tin-plate workers, and every other trade, and it was difficult to say who or what was a plumber. He was not exaggerating when he said such sign boards could be seen throughout England, and some within a few miles of where the lecturer was standing. The lecturer here showed a diagram representing an enlarged copy of an actual card in his possession, and a specimen of many such. On the left hand was an illustration of a pan-closet, seen in section, fitted with D-trap, and directly connected with a cistern above, in which was a service box, and the following:—

X. Y. Z.
Builder, Plumber, Painter,
Glazier, Carpenter,
Range and Stove-Maker,
Hot-Water Engineer,
Pump Maker and Sanitary Engineer.
Water-Closets fixed on the *newest* principles.
Writing, Graining, Marbling,
Fountains Erected.

He contended that no man should be entitled to call himself a plumber until he understood the art of plumbing, and he would insist upon every man being licensed before being able to write sanitary engineer on his board or door-plate, and before this should pass an examination before authorised examiners.

There is no trade so important as plumbing. The medical man was now fully alive to the value of house sanitation, and when he had reason to believe that his patient was suffering from a complaint attributable to bad drainage, he at once called upon the head of the house to set the drains in order, and that the plumber should be equal to the occasion. A badly ventilated waste-pipe, or a drain ventilating itself into a house through the service-pipe, a drinking fountain badly placed, or with any connection with the w.c., was quite sufficient to make a house unfit for occupation. Now when anyone was allowed to set himself up as a sanitary engineer, regardless of any competency for it, how were the public to know the skilled man from the unskilled and unqualified man; there was no means of testing his knowledge or qualification. People went into their w.c.'s, and found that it was like going into huge smelling bottles; but they had paid for the work to be done properly once, and rather than pay again they would run the risk of sickness. The public should be guaranteed against unsanitary plumbing, and plumbers should be compelled by Government to have a license, then the health of this great city, the health of our towns, hotels, and seaside lodging-houses, would be greatly improved. The lecturer here alluded to his experience of the unsanitary state of country and continental hotels. Plumbing was not one of the things of which it could be said, 'they do these things better on the Continent'. There was no difficulty in fixing a closet that would throw out no odour at all, but that would keep as clean and as sweet as a toilet-basin.

It was monstrous that here in London, where he believed plumbers were more skilled than in any other city in the world, there was no sanitary science

institution where plumbers could pass an examination to receive diplomas in the science and art of plumbing. He believed such a school would do an immense deal of good in spreading the theoretical why and wherefore; and the public would reap the benefit of this in having happier lives, lives more free from petty annoyances, and healthier homes in which their lives would be passed. The object of such schools would be to impart a practical knowledge of plumbing, and class-rooms should be set apart for young plumbers, and students should contribute towards the expenses. Models of plumbing should be placed where the student could examine and study them. Classes should be formed, and instructed by practical plumbers, and examined from time to time, and rewards given according to merit. Lectures should be given from time to time, illustrating and explaining the newest principles in sanitary plumbing, and old errors should be pointed out and condemned. Plumbers meeting thus together could compare experiences, and correct wrong impressions. The crowning part in connection with that school, or sanitary science hall, would be that certificates of merit would be given to those who qualified themselves to receive them, and the public could be assured that when they called in such that they were employing competent men.

If some rich person, who wanted to do a noble deed, would give a legacy to form such a school or institute, and give an additional sum to be appropriated in prizes to be given to young plumbers acquainted with the theory, as well as the practice, of plumbing, an immense impetus would be given to perfect plumbers in their craft. He believed the City Guild of Plumbers was at last going to bestir itself; although it had been established since 1365, it had not done anything for any one plumber present to encourage them in the art and study of their craft. There were their Unions; what had they done to advance a knowledge of plumbing, or had they done anything to better the plumber's position. Notwithstanding all the charges against plumbers, however, he thought they were more sinned against than sinning. Architects did not interest themselves in such matters, devoting far more attention to the elevation than to the hidden details of the working drawings, and so they saw old-fashioned or very vague specifications, or perhaps such a plan as one he had illustrated, where tiers of closets, lavatories, and sink waters were required to be fixed above each other to a single soil-pipe, which was continued above the roof. He did not now allude to Mr. Norman Shaw's scheme, for although he did show a succession of wastes leading into one soil-pipe, he believed Mr. Shaw did not allow the w.c.'s to be fixed in this way. Building overseers, again, did not interest themselves in plumbing. A few pounds laid out on wall-papers would renovate a dingy house, whereas, after calling in the plumber to rectify evils, nothing was apparent except a pigeon-house cowl on the roof, and a long bill on the library table. Architects were deeply interested in this question, and if they were but to work unitedly in bringing about changes in the old system of plumbing, a marvellous improvement would be effected in the course of a few years.

II.—Joints and Pipe-Bending.

Almost anything and everything can now be made by machinery—clothes for the back, shoes for the feet, the watch in the pocket. By its aid wood, stone, or iron can be cut into any shape and taken to the very spot where it is wanted. The inventive genius of mankind is so great that he has brought the country house alongside of the town warehouse. He may sit at his country house, and the living voice sent to a friend travelling in a distant land, and the music of its notes may be heard.

The United States of America may be called the forcing house of inventive genius, but although the Americans have invented machines to help everybody as well as the plumber, they have not yet invented an apparatus for making wiped soldered joints; they have, however, invented a machine for uniting lead pipes of small diameter together by what are called welded joints, but it is inferior to a wiped soldered joint. Joint-making may be called the alpha and omega of the plumber; it is, so to speak, the staircase which takes him into the various rooms of plumbing knowledge, and to leave joints out of plumbing would be to leave the Prince of Denmark out of the play of *Hamlet*. Joint-wiping is to the majority here an everyday task, but it is very difficult, and so difficult, that no man without considerable practice can accomplish it; and some plumbers, though they make joints daily, never learn how to make perfect joints. There is always something the matter with the joints made by such workmen, they are either gouty or potatoey, too light or too heavy, too dumpy or too elongated, and though they are not, like the world, flat at the poles, they are flat at the sides. They are by no means symmetrical, and their want of roundness is everywhere observable. The experienced joint wipers would bear with him, the lecturer said, while he instructed the uninitiated in difficulties of joint wiping and joint making. In preparing the ends of the pipe to be connected together, either in vertical or horizontal positions, see that no burr is left on the inside of the pipe. In rasping off the outside edge of the pipe a burr is made in the inside, and if it is not taken off with a shave hook the roughness would be liable to catch hair or other substances passing through a soil or waste pipe. The end of the outer pipe should be well opened, to allow the inner pipe to enter about one quarter or three-eighths of an inch without contracting it in any way. The outer edge of the outside pipe should be rasped off, to get a greater thickness of solder upon the joint without increasing its external size. In soldering over the ends of the pipes the workman should solder over at the same time, or better still, after the ends have been shaved, the inside of the inner pipe, so as to prevent the solder from running through and adhering to the edge, brightened by shaving off the burr.

Having shown by example how to get a true ring round the pipe for the shaving line, Mr. Hellyer said it was necessary in shaving the pipe to be careful not to dig the shave hook down into the lead, especially at the outer edges, as it would weaken the wipe where there would be no thickness of solder to strengthen it again. All that is wanted is to take off the dulness of the lead to enable the solder to readily tin upon it. When joints have to be made in pipes in their positions, the ends of the pipes should be tinned upon the bench before they are put into the places they are to occupy, so as to prevent any foreign matter, like brick dust, mortar, etc., getting between the solder and the pipe, and also to ensure the end of each pipe being well tinned. In jointing, especially in all soil and waste and drain pipes, the ends of the inner pipe should always go with the stream, *i.e.*, the edge of the inner pipe of the jointing should not be

fixed against the current, inasmuch as it would form a ledge for the accumulation of filth.

For the benefit of the unskilled in joint wiping the lecturer said a word on joint making, and first, as to the solder. He said nothing about the preparations of soldering, which is generally bought ready for use, but continued—solder for upright, branch, and flange joints, and for sink and cistern wiping, ought to be a little finer than solder for making underhand joints. When the solder is found to be too rich for underhand joints, put a little soft piglead into it. When you have got the solder quite right for easy use, keep this solder pot solely for making underhand pipes, and get another for general work, and as the tin is wasted by constant heating, the solder pot used for making underhand joints should be fed from the richer solder pot, which should be fed from the new 'casts' of solder. 'Waste not, want not', would be a good motto to put round every solder pot. It should not be wasted by putting on more than is required, or by overheating, or by always keeping it over the fire; that might do for the cooks, but would not do for the plumber. In heating the solder over a coal or coke fire, keep the cover on the pot to keep the heat from flying off; but in heating it over a wood fire, a large ladle should be over the top with its mouth downwards, allowing it to sail over the top a little, so as to catch the flame and turn it inside to assist in heating the solder, but too fierce a flame must not be allowed to fall upon the solder to eat the tin away, for the tin rises to the surface. Remember, time is money; therefore get the solder heated as quickly as possible, taking care not to get it overheated. You ought to be able to tell the right heat by taking out a ladlefull and holding it near the face; a piece of wood is a very good indicator, for if a stick when dipped into the solder smokes, it is ready for use.

In making an underhand pipe first pour the molten metal on the soiled parts of the pipe to warm them; then a dribbling stream should be poured upon the shaved parts of the pipes, which should be well tinned by pulling the solder round and round with the solder cloth. You should keep on pouring out the metal, and let it flow in one continuous stream round and round on the outer edges of the tinning, at the same time working the solder towards the centre part of the joint. After manipulating it in this way, directly it is of one consistency and in a teachable mood, wipe the joint, and coax the solder round and round to get the joint symmetrical. If you prefer to use iron, see that it is well cleaned, and just redhot before using, then, when you have a nice body of solder on the intended joint, rub the hot iron on the solder, round and round it, and work it up into a nice consistency upon the cloth, forming it all the while into the shape somewhat of a sausage roll. You should then quickly place the centre part of the solder against the underside of the pipe, and turn up the outer half on the off side, bringing the hand back quickly to turn up the other half on the near side; then wipe the joint with all the dexterity you can. Of course, these remarks apply to underhand joints upon small pipes; in making them on big pipes there will be no difficulty in getting it to stay upon the upper sides of the pipes, the difficulty will be to get it to adhere to the under sides, where it has a tendency to drop off in lumps directly the pipes get hot. In making this joint you should keep moving the solder round and round the pipes, pouring the metal upon the cloth, as well as upon the pipes, to convey the solder to the under side of the joint in a molten state. This should be alternately done on both sides of the pipe during the process of making the joint, and the solder forming round the under side of the joint should be brought round on the upper side. When a good bulk of solder is formed on the pipe, the ladle should give place to the iron, and the joint should be wiped as expeditiously as possible; the secret of success is to keep the cloth following close to the iron. The outer edges, to make a nice clean joint, must be kept well heated with the iron.

An overcast joint is made in the same way as a wiped joint, in fact, it is a wiped joint overcast with the iron; that is to say, directly the joint is wiped, and while the solder upon it is still hot, a hot iron is drawn up and down over its surface, forming a rubbed surface. Plumbers in the early part of this century were very clever in making this form of joint. I have seen many overcast joints on the Continent perfectly made, but overcasting a joint is time wasted, for though it may give additional strength, and prevent weeping in joints made upon service pipes when under very great water pressure, a wiped joint is really all that is necessary, and a wiped calls out greater skill in the joint wiper. Overcast joints are never made now in England by good plumbers. In Scotland the joints are only made about half the length of joints made by English plumbers; there is a saving in solder, but an absence of beauty in it, and art should count for something. The lecturer here described, by the assistance of diagrams, upright joints, and the means in use for preventing the waste of solder by the use of collars fastened to the pipe. Plumbers do not always take the best means to catch the droppings, they tie wisps of straw or pieces of wood and cateh it in this way, and often spend more time in picking up the solder, than in making the joints. There was this great advantage with the arrangement of the collar, that the solder falling into the collar keeps the pipe hot, and thereby facilitates the making of the joint.

Mr. Hellyer, having explained the use of the splashing stick, said there were two points which the learner will do well to remember. 1. When the branch pipe is smaller than the main pipe, the solder will rest readily upon the jointing; but where the pipes are of equal sizes, the solder will have a tendency to fall off at the two opposite sides. In jointing such pipes the catch-board, or whatever the solder is caught in, should be kept close to the underside of the main pipe, for the falling solder will not only help to keep the pipe hot, but it will also enable the plumber to dip his splashing stick into it to supply the place of the falling solder from the sides. 2. As the lower part of the jointing will be kept well heated by the solder upon it, the solder should be well splashed upon the upper part, *i.e.*, upon the branch pipe. The old principle of connecting branch soil-pipes with main soil-pipes cannot be too severely condemned. No branch pipe should enter a main soil or waste pipe at right angles. If plumbers were also joiners he could understand how mitre joining got introduced. Such a joint is utterly wrong in principle, and takes more time and more solder than necessary to make a properly formed joint. Block; flange, tuft, copper-bit ribbon, overcast ribbon, and astragal joints were explained by reference to diagrams and models, when the lecturer proceeded to deal with the subject of pipe-bending.

Mr. Hellyer said, I now come to the important subject of pipe-bending. 'It is a long lane that has no turning', says the proverb, and a plumber cannot go far in fixing a pipe—whether a soil, waste, or service pipe—without going to the necessity of turn-

ing or bending it, to suit localities, and upon the principle of such bending or turning will depend the wholesomeness or unwholesomeness, other things being equal of such piping, be it a soil or waste pipe, after it has been in use only a short time. Turn or burn was the phrase in the martyrs' days, and they preferred to burn. With bad treatment, and in unskilled hands, lead piping was very stubborn, and would break rather than bend, but in skilled hands it was very pliable, and would bend and turn in any direction required, with the grace with which a swan bends its sinuous neck. Having been bent in one direction, it will not go far before circumstances will call for it to turn in another. Bending them is an important bronch in plumbing knowledge.

In olden times, and it is still the usage in some places, it was the practice with many country plumbers, when they wanted to turn a pipe, to cut and solder it; that is, they made an elbow-joint. There are several objections to elbow-joints; unless properly made one pipe is left to stand up inside the other, half-an-inch or more, and is often made without any consideration of thedirection of the water-flow through it, and often gets choked by the discharges through it, allowing the filth to collect. The bending of lead funnel-pipes, without cutting or soldering them, commenced about forty years ago; but for many years afterwards it was only a plumber here and there, very skilled in lead-bossing, who succeeded in making a perfect bend. There is an art in bending lead-pipes; many so-called plumbers try it, but they miserably fail, for in bending the pipe they considerably diminish its strength, especially at the heel of the bend, and the whole length of the pipe is depreciated accordingly. That is not the only evil, they contract the tubing in the neck part of the bend, often to half its original diameter. By these defects the value of such a pipe for its purpose is considerably reduced. If a stack of 4-inch pipe is reduced to 3-inch at its end, the whole of the stack might just as well have been 3-inch, at a reduction of cost to the houseowner; 3-inch to 2-inch, 2-inch to 1½-inch, and so on. No one with any fair knowledge of plumbing would allow any such pipe-bending on their works. A skilful plumber will provide for this; he will, in bending the pipe, twist the lead round from the head to the bottom, where there is a deficiency.

In a 3½-inch or 4-inch lead pipe (or any size above 3-inch), well heat the pipe by a flame from a gas jet, or by shavings put inside the pipe, or by pouring some hot lead or solder upon the part to be bent. The pipe should be made as hot as you can, without melting it. If it is a long piece of piping, stride over it, and press your hand (with a felt or thick cloth under it to prevent the hand from being scalded) upon the pipe where it is to be bent, and get your mate to pull up the end of the pipe, humouring the bending part as much as possible to keep it in a circular form, to prevent it from crippling. He should then lay the pipe down on one side, and with two or three sharp strokes of the dresser, dress the bulged part of the piping from the side facing him round towards the heel of the bend. He should then turn the pipe over on the other side, and dress the bulged part of the opposite side round to the heel. By this means you will thicken it where it has been weakened by bending it, and you will at the same time be giving room for the dummy to work inside the pipe. You should then take the dummy, put it inside the pipe, and get your mate to knock up the neck part of the bend with the bulb of solder on the end of the dummy, while you dress out the irregularities; dressing the lead over towards the heel, to thicken the lead there. Do not attempt too much at a time, for to make a good bend, and to make it quickly, several such heats must be given it. Some young plumbers overbend their pipes, by making them as sharp as possible. No bend should be made sharper than necessity requires, and remember no bend is properly made in a lead pipe, where the lead is in any part reduced in strength less than its original substance. It is said to be the custom to use a bobbin and followers; such a means may ensure the pipe being kept full-bore, but they reduce its strength, and to adopt such means shows that the worker is not an observant man, who would know the nature of the material he is working upon.

All the tools a plumber wants to make a perfect bend are a dummy and a small dresser, and if he cannot do without the use of bobbins and followers, he had better 'bob' out of plumbing, and 'follow' some other calling. The lecturer called attention to the specimens exhibited, which he invited those present to examine and criticise, which were made by the employés of the firm to which he belonged. The lecturer, in conclusion, observed that when a man can make joints and bends as I have described them to night, he has, so to speak, the trade of a plumber in his hands, and can do what the most learned professor in the land could not do. His hands are so educated that he can do what he likes with lead and solder, and talent, wherever it is found, should be respected. I want plumbers not only to educate their hands, but to educate their minds too, and never be satisfied with themselves until they have learnt the science as well as the art of his trade. Though they might become good joint-makers and good pipe-benders, such acquirements are not enough.

The Chairman, Mr. W. R. E. COLES, of the National Health Society, said he felt unfeigned pleasure in attending the lectures, for he saw on each occasion some 400 to 500 men representing the plumbing craft came forward to support these lectures which had been got up by the National Health Society, and which had for their object the improvement of craftsmanship, and he said that he particularly noticed the men applauded what in his judgment formed the best parts of the lectures, namely, the references which were made by the lecturer to goodness of work. To all good men the contemplation of the best order of work must be pleasing, whether the work was plumbing or anything else; and he (the Chairman) thought the men applauding as they did was a very good sign. He was glad to tell the meeting that the National Health Society had received communications from plumbers in the provinces, saying they would be glad to have an opportunity afforded them of competing with the London plumbers in the work to be done for the prizes offered by the National Health Society, and they stated they were prepared to pay the expenses of the journey to London for the purpose, if that was necessary. He (the Chairman) thought the meeting would be glad to hear it, for men who could do good work, were proud of it, and would gladly welcome competition in good work, come from whence it might. The Chairman further stated that the prizes offered by the National Health Society would be given upon the adjudication of a Committee of practical men, and the Chairman of that Committee would be Mr. George Shaw, who was the late Master of the Plumbers Company, and who was present Examiner to the Plumbing, Tin, and Zinc Work Department of the City and Guilds of London Institute for Technical Education.

THE PREVENTION OF EPIDEMIC DISEASE.*

By Mrs. Johnstone
(Superintendent of the Hastings Sanitary Aid Association.)

I come here, not as a theorist, but as the advocate of a system which has stood the test of ten years practice in the Borough of Hastings. I therefore address you in good hope that I may succeed in winning your concurrence in my scheme for organising in London, in every Health District, such intelligent co-operation with the Medical Officers of Health, as shall complete the resources of those gentlemen to the (all but total) extinction of small-pox, scarlet fever, diphtheria, and every other deadly epidemic disease.

The basis of our work was a memorandum sent to me by Dr. Druitt, drawn up by him in 1871, to shew the points at which the resources of the London Medical Officers of Health fell short of enabling them to extinguish epidemic disease. More recent Acts of Parliament have remedied some of the then existing deficiencies, as, for instance, the lack of proper means of conveyance of infectious cases, and the want of power to recompense poor people for clothes or bedding destroyed for the sake of the public health by the Sanitary Authorities, still the two following necessities remain: First, that the Medical Officer of Health shall have at his disposal, not only his Inspector, who in general terms gives orders, but also a thoroughly competent woman teacher, who will instruct the women in the details of disinfection; and second, that, besides his power of threatening pains and penalties, he shall have the power of sending relief, conditionally on the fulfilment of his instructions. The second provision must be rendered complete by that intelligent volunteer co-operation which is exercised at Hastings by the parochial clergy and other controllers of schools. Not only must relief be given as the reward of the fulfilment of the instruction; other relief (such as that from any parochial alms fund) must be withdrawn, or if given, so given as to be understood by the recipient to be as entirely conditional on her good conduct, as if it came direct from the Sanitary Aid Visitor. Yet another observation as to relief: It must be sufficient; it must be such as to do away with the misery of the situation.

Relief, as above described, not only procures the right management of discovered cases, it takes away the motive for concealment. When generally understood, as it soon might be, by means of the intelligent co-operation of all who have to do with the poor, the concealment of fever cases would no more be practised than the concealment of surgical cases. I shall here be asked, 'Give us a specimen of what you do in Hastings, and then explain how you propose to deal with the population of London'.

Firstly as to information. The clergy, the district visitors, schoolmasters and mistresses, volunteer school visitors, mission women, anybody, and everybody, is encouraged to communicate to the Sanitary Aid Manager, or Visitor, any suspicion of a fever case. It was found insufferable that this should be done direct to the Medical Officer of Health, for his time, and that of his Inspector, does not suffice for running after uncertain cases, but it is amply worth while that such cases be attended to by the Auxiliary Agency, and very careful are both Manager and Visitor never to snub anybody whose information proves to be based on grounds slighter than the full evidence of a scarlet fever case. Some of these cases, though attended by slight illness, so that no doctor has a chance to identify them, are real scarlatina, and if left to chance are the occasion of worse, therefore we attend to them, though we never enter as scarlet fever in our books any case upon which a doctor has not pronounced his judgment.

I will now suppose a distinct case, defined so to be by a doctor. We promote removal to the Sanatorium, if possible, that is, firstly if there be room; secondly if the case be eligible, which is, resident within the Borough boundary, and (usually) not an unweaned infant, though in an instance where mother and children were all ill before discovery, the whole party were received at the Sanatorium, but usually an infant remains at home, as the mother can neither be spared to accompany it, nor be parted from it; third, if the parents will consent. Sometimes these, or the father only, will absolutely refuse, and if they can show that they can isolate the case in one room, no compulsion can be put upon them, though their undirected management of it would almost certainly be a failure. It is then our business, till the end of eight weeks from the date of the appearances of rash, to visit that case, to teach disinfection, to supply changes of linen and bed-clothes, to lend aprons for the mother, and to give relief; in doing which we always try to furnish what the doctor in attendance orders. We give assistance in labour, at the wash-tub, etc., which, as everything is disinfected, can be rendered without endangering anyone else's family, and we always finish up the case with a present of fresh clothing, for though we never destroy in disinfecting, we shrink and more or less damage many a woollen garment, which we always replace with full value. Be it understood that the house in which we are at work is usually full from top to bottom, the isolation is one room only; and if the case be a clean case, when the time of half quarantine arrives, and the convalescent is partially restored, it is not one room, but one corner of the family room that he occupies. A clean case is a case unattended by any description of involuntary discharge. In a case the reverse of this, no half quarantine can be allowed, and the nurse must be isolated, as well as the patient, for eight weeks. In attending a child above infancy, I could show you, from our books, numbers of instances of a mother nursing the patient, and doing for the rest of her family, without infecting anyone, but if the patient be a baby, we must get all the others out of the way, or we shall not save one of them.

We have only once, during our ten years' work, had one lodger's family infected by another under the same roof. When the first case was put promptly under our care, and this was in an instance of an undefined case, of which the doctor had not seen enough to give it a name, and the mother neglected our instructions till a second child took the fever and died, and one other child of another family was infected, but after this no more sickened; both the mothers following our directions.* No parochial day school has ever been closed in the Borough of Hastings through scarlet fever since we began work, but one was, three or four years ago, within an ace of it. This school had case after case without letting us know; we at length found it out by means of

* Read before the National Health Society, May 23rd, 1881

* When a child is old enough to exercise intelligence we enlist its co-operation with its mother in the use of disinfectants, and in keeping rules, especially during half quarantine. We promise in such case a little reward, if, at the end of the time, no one is infected, and very well spent is the sixpence or shilling thus bestowed. This also works admirably in dealing with ringworm.

cases in another school belonging to families divided between the two schools. When this transpired we went to the authorities of the first school, and found that thirty-four absentees were on their books, besides many that had been away and returned, all from scarlet fever. Now I beg you to observe two points. The thirty-four cases were to eight families, an average of four-and-a-quarter to a family, whereas in our work elsewhere of the same year, where we had been promptly called in, twenty-eight cases stood to twenty-eight families, one each, the mother nursing and infecting no one else. And again, having discovered the thirty-four cases we looked after them, and from that time the spread of fever in that school ceased, and the closing (then in the act of being discussed) was saved.

I say to all the many* who, in Hastings, declare that it is the climate, and the excellent drainage, which keeps away epidemics, will they explain why in that year (1877) the one school in Hastings which concealed its cases from us had so many? And again, why, when we got hold of them, it had no more?

Now for the question, How do I propose to handle London? and you may as well say the United Kingdom, for I aim at nothing less. One of my chief objects is to save the gentlemen's and the ladies' schools of our country from the anxieties attendant on the importations of infectious fevers, and as, to save the schools of Hastings, we could take no narrower basis than the whole area of the Borough of Hastings (to say nothing of adjacent villages, which we dare not leave alone), so, to save the gentlemen's schools of England, we must deal with all England. And with this view my first aim is educational. From the Universities to the Board Schools inclusive, women might be taught what infection is, and how to meet it, with only a very small taxation of their time. I most earnestly desire to see it made a compulsory subject on the code for women. All cases, excepting those in camp and ship hospitals, are in the hands of women, and while I am far from intending that this information should be limited to women, I say that, did they but generally possess it, so that every Medical Attendant and every Medical Officer of Health would find intelligence, instead of ignorance, on the part of all with whom they have to do, rich and poor, an enormous benefit would accrue to the whole of society.

It is incessantly happening that in wealthy families too little is understood to prevent removals for change of air for infectious convalescents. If this were stopped for six months, wholesale diminution of fever would be the result. The mischief that is done by this practice is of the very worst. Every one knows how, from time to time, something like a clean sweep of some unfortunate family will occur in some seaside lodging. The reason is this: Infectious subjects have slept in the beds, they have given forth perspiration night after night, this remains in the blankets and putrifies there; another family comes, the children sleep in those blankets, inhaling the poison, with accumulation, all night (which is a widely different thing from receiving a casual whiff of someone's infected breath), and those unfortunate children sicken and die of malignant fever, which defies all remedies (well is it if their mother be not a victim besides!), and the hapless parents return home desolate. You all know that I am drawing no fancy picture, and is it not evident that this could never happen again if I might teach the women of England not to do that which causes it?

Shall I be told that convalescents must and shall have early change of air, and these consequences, if they cannot be ignored, shall yet be disregarded. In the first place, numberless instances of fatal consequences to convalescents occur from cold taken on these journeys; and, in the second, is it really true that we will seek a supposed benefit for our children by means which will probably murder those of others. I say, then, put this subject into the compulsory code, and teach it to all woman kind, and great practical good will follow.

Now for the special difficulties of London, and of all the great cities. How are we to penetrate the masses, so as to have knowledge of what occurs amongst them? How are we to find or make the requisite space—for a room to each existent case we must have—for handling them? The question is, how are we to find relief, and administer it to them? To settle these questions we want a Committee consisting of representatives from the following bodies, and probably from some others which have not occurred to me. From the Female Educational Department, from the London School Board, from the Guardians of the Poor, from the Merchants and Manufacturers of London, from the Metropolitan Asylums Board, from the Charity Organization Society, from the St. John's Ambulance Society, and last, but by far the most important, from the General Council of Medical Education, from the Epidemiological Society, and from the Medical Officers of Health. Without the assistance of these the whole enterprise will lack firmness of basis and compactness in all its parts; but I leave their share in it to the last, hoping that they will have patience, and hear me to the end.

To penetrate the masses the Committee would have to connect intelligently with themselves all ministers of religion, and their scripture readers, district visitors, mission women, volunteer school teachers; all discoverable common nurses of the poor; local school boards, with their school attendance officers, schoolmasters and mistresses; local poor law guardians, with their relieving officers; perhaps vestrymen, rate collectors, merchants, manufacturers, and all employers of labour. Meetings might be held; pamphlets might be circulated; and the columns of the daily papers might be used to spread the requisite information amongst all these people, until all were intelligently connected with the Committee.

To find or make the space requisite for isolation. Of course use the fever hospitals so far as they may be available; and for the accomplishment of isolation where hospital accommodation cannot be obtained, houses might be taken in every district, according to requirement, to serve as lodgings, some for girls and some for boys, for relief of crowding in any house in which fever may appear, removing thither not the sick, but the sound, who must otherwise be exposed to infection. In dealing with a family our first care is always for the father, that he may neither contract nor carry infection, and next for any other breadearners of the family. This is, in London, the worst of all difficulties, for I am aware that though there are Acts of Parliament which are intended to prevent overcrowding; there is power to turn out, but not power to find whither to turn in the ejected, and consequently these Acts are almost inoperative.

Two great measures would be required to relieve the congestion of population. First, to construct, within easy reach by rail, dwellings that should

* As respects any general recognition of our work, Dr. Druitt said to me at its outset, 'Remember that the more successful you are, the harder you will find it to obtain either the acknowledgment or support of your work, for *prevention makes no show*'.

suffice for the healthful and decent shelter of the people of London, reasonably estimated in relation to the industries of London, and to control the rents of these, and of all lodging-houses whatsoever, as cab fares are controlled; second, to lighten pressure, as required, by compulsory emigration, to be drawn for by lot, and assisted as to travelling expenses, and on landing in a colony. Is this too great an undertaking for the might and for the wealth of this country?

Now for the third question, How are we to find relief and administer it? At first this would require a great sum, which, probably, must be chiefly raised from private sources; but if the administration of the fund were undertaken by a body already possessing the confidence of the benevolent, such as the Charity Organisation Society, surely it might be raised. I have brought up a working book, which exhibits the cases of the last three years, and reports which show our resources and expenditure. It would not be necessary that all required money whatever should be drawn from a new fund; it ought to be a simple matter to bring about, that wherever parish relief is allotted to fever patients, it should be understood to be received conditionally, on fulfilment of the directions of the Medical Officer of Health, as conveyed both by his inspector, and his female teacher.

I have now a few words to say to medical gentlemen. If I may judge by letters published in the *Times*, there is not a system of quarantine and disinfection, specially in relation to scarlet fever, that can at present be named as agreed upon and accepted by the medical profession as absolutely satisfactory. The imperfection of the results attending all ordinary efforts at the extinction of this disease, sufficiently demonstrate that an effective system has not been, as yet, elaborated to completion. I offer such a system, and during our ten years' work, not once has infection been known to be communicated by a convalescent of ours in school, or house of business, or anywhere else. Our sheet of rules differs by about three points from those in ordinary circulation, and upon those points turns the entire difference between complete and incomplete success. I offer my evidence, not, indeed, as a teacher, but as a pupil of the medical profession. I learned all that I know from physicians, specially from two who are named in our manual, and I am simply the persistent practiser and propagator of their doctrines. Perhaps, in conclusion, I may as well say, in a few words, what I could, and what I could not undertake, supposing that my help were desired in organising sanitary aid work in London. In brief, I could teach women, and explain our work to meetings, wherever audiences might be assembled, and I might be brought to them; but I am sorry to say it would have to be on easy terms physically. I could, however, without hesitation, undertake as follows: To teach a body of first class women, who should themselves become teachers of women, from the Universities to the Board Schools, inclusive. And next to teach women of the class of paid parish workers, who could become the female teachers under the Medical Officers of Health. There is a great deal to teach them besides the rules of disinfection; they must learn how to approach, not only the poor, but the independent (a much more difficult class to deal with), or the work would break down under their hand. And throughout the districts of the Metropolis I could address meeting after meeting. I would give evidence to any extent that might be desired before the Committee, which I hope to see formed as a consequence of this day's meeting. I ought perhaps to add that I feel it would be indispensable for the auxiliary work to be placed at the direct service and bidding of the Medical Officers of Health, but that these gentlemen must be entirely free from the burden of handling its machinery; they could not, I am sure, undertake to keep new accounts of any kind, nor write entries of work. For this, the help of ladies might well be found, and am I wrong in thinking that, as, in the line of elementary surgery, they have proved themselves ready to come forward, and apt scholars, so they would in this line, were they but taught what they might do, and how to do it. In the matter of the dissemination of instruction, the St. John's Ambulance Society, would they but adopt this subject as a regular part of their course, might render great service; they are already well known and universally well received. The only addition which they would have to make to their staff would be a lady teacher for this subject, as no class of ladies could learn it from a gentleman, unless they were prepared to be addressed as medical students. Ladies acting as superintendents of sanitary aid work would not be exposed to infection; theirs would be desk work only. Until a better shall be written, perhaps the lessons which I have given to the Ladies' Educational Society at Hastings, and, last year, to a class formed as a sequel to the St. John's Ambulance Ladies Class, might be used as a manual for general circulation.

In conclusion, I would remark, there is one word, and only one, by which all that I have said will be met in this Metropolis. No one will say it is bad; no one will say it is unnecessary; but on all hands I shall hear, as I have heard elsewhere, you 'can't: you 'can't find the right instruments; you 'can't get rid of such and such opponents; you 'can't overcome such and such obstacles.' I reply, the word is not in the dictionary, and that everything that is right may be done.

All opposition has been withdrawn to the bill authorising the construction by a company, of conduits from Lancing, on the Sussex coast, to London, for supplying the metropolis and the intervening districts with sea water. It may be presumed, therefore, that this useful project will be carried into effect. The period allowed by the bill for the completion of the undertaking is seven years. The principal metropolitan termini of the pipes will be at St. John's Hill, Battersea; Maclise Road, Hammersmith; and Victoria Street, Westminster. The maximum rate to be charged for the sea water to the owners or occupiers of private houses connecting with the company's mains will be ten shillings per thousand gallons.

In examining any kind of farina with the microscope to find whither a less nutritive farina has been mixed with it, it has been common to confine attention to the starch granules (which one may easily be mistaken about): Dr. Cattaneo states in the *Re. ist. Lomb. Rend.* vol. xiv. fasc. v., that greater importance should be attached to the character of the bran-particles, some of which are never wanting even in the most carefully-bolted flour. These (as he shows) differ in a marked way according to species.

Messrs. Robt. Boyle & Son are at present applying their complete system of ventilation and air-pump ventilators to Knowsley Hall, Lord Derby's seat in Lancashire.

A SERIES OF REPORTS
ON
SANITARY POTTERY, TERRA-COTTA, FAÏENCE, AND SANITARY APPLIANCES.

BY OUR SPECIAL COMMISSIONER.

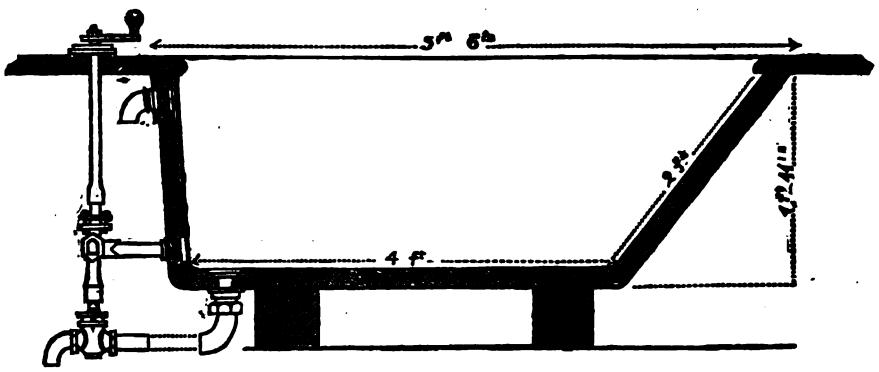
VI.—LAMBETH HOUSE DRAINAGE, BATHS, LAVATORIES, SLOP SINKS, URINALS, ETC.

To write the history of bath appliances would be to write that of almost the whole of sanitary contrivances, seeing that they must have been invented the moment that cleanliness and the means of effecting it were made an indoor necessity and a criterion of respectability. From the homely made wooden tub, however, to the finished article of the present day, with its valves and fitted wastes, the contrast cannot be called otherwise than astonishing. It has been remarked, indeed, that we have become too fastidious, and that the best essentials for performing ablution are found in the least complicated fittings of the kind. This is especially felt to be the case when elaborately fitted up patterns of baths are sent into the country places, or shipped for colonial use. I do not seek to disparage in any way those triumphs of prize baths frequently seen in exhibitions, as they find a suitable place in lordly mansions and palatial hotels. But I wish to assert that the more and more cheaply constructed baths are produced by our sanitary firms, the sooner will each house and cottage home be found in possession of this great sanitary adjunct. And in point of fact, provided that the simplest form of bath be fitted up with good sound hot and cold inlets, and a sufficiently large outlet, any kind of useful ablution can be performed in it, with the added aid of ordinary special appliances. Thus there can be douches, spinal, rose spray, shower, or the usual local applications, with a mere small assortment of special tubes, etc.

This notice is not intended to deal with the Roman or semi-Roman, or independent headed baths, or gas baths, manufactured by Messrs. Doulton in zinc, tinned iron, or copper, but to draw special attention to the earthenware baths manufactured by them. The substitution of porcelain, especially of earthenwares baths, for metal ones, is a great boon, and for hospitals, unions, hotels, public baths, and cottages, etc., this product has proved of immense public advantage.

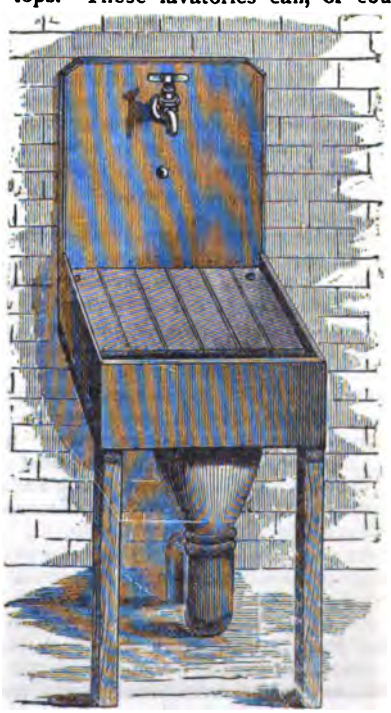
The dimensions of this useful bath, which is glazed inside, thus rendering it easy to cleanse, and so as to be free from entailing infection, are 5½ to 6 feet in length, 2 to 2½ feet in width, and 2 feet in depth. Being two inches in thickness also, and suitably banded, it is strong enough to resist all but wanton by bad usage.

With regard to the lavatories specially produced at Lambeth, they include the Lambeth Pedestal Lavatory, which is very suitable for public places, embracing, as it does, every convenience for six persons, and yet permitting much of the wall space to be utilised for dressing tables, etc. The supply is preferably from the Patent Self-Closing Press Valve, which obviates any waste of water, and the soap dishes, which radiate from the centre of the hexagon, have a general waste, carried off by a single pipe. The firm also manufactures ordinary tip-up lavatories for one or more persons, with basins of highly glazed



Doulton's Earthenware Bath. No. 41.

Queen's-ware, and with plain or enamelled slate or marble tops. These lavatories can, of course, be

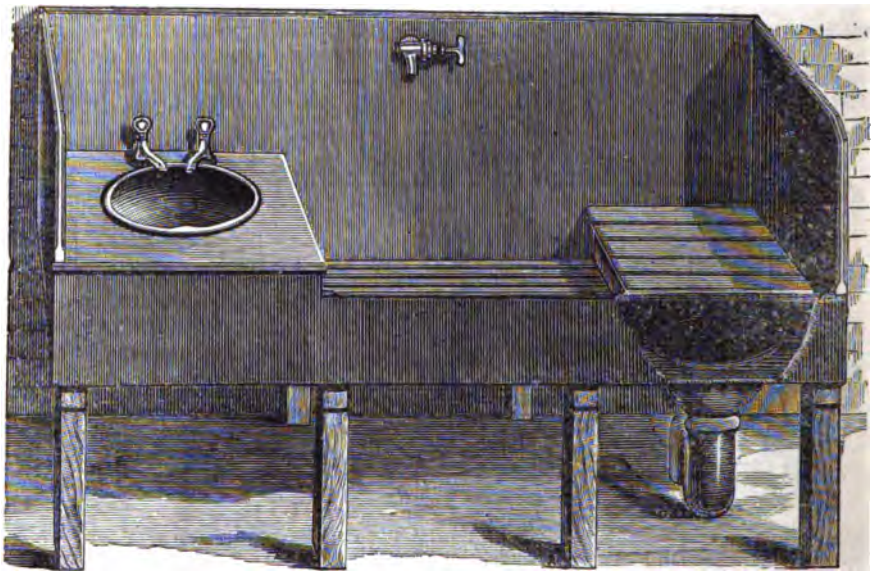


Housemaid's Slop Sink. No. 36.

surrounded by any kind of cabinet enclosure, but as æstheticism now reigns almost everywhere—our more

ordinary public places excepted—toilet lavatories are produced at Lambeth to any design, with hand-painted tile decorations and valve mountings in chosen Doulton ware.

Perhaps the most useful appliance in a house, is a well-constructed housemaid's slop sink; at all events the residence which lacks one is full of miseries to proprietor and servant alike. Use is also made too often of leaden sinks, which splash the person unnecessarily. In the ordinary No. 36 slop sink, for upstairs use, manufactured by Messrs. Doulton, this is avoided, and moreover they are provided with a hinged cover, which permits of a can being placed over it for refilling purposes. This pattern can be obtained so as to fit in angles, if so desired.



Combined Slop and Wash-up Sinks and Lavatory. No. 33.

Among the more advanced kinds of production in this article, may be noticed the combined slop sink, wash-up sink, and lavatory, No. 33, specially designed for hospitals, unions, and the like, but suitable to any large building.

The slop sink portion is here fitted to receive the contents of the bed-room pails generally, being trapped at the bottom above the floor level. This trap will always be kept full of more or less cleanly water, which is drawn from the draw-off taps, and finds its way there. And here ought to be pointed out, that, unlike most other sinks, the draw-off taps are not situated over the slop-emptying receptacle—a matter of considerable moment anywhere—and, furthermore, there is a wooden grating provided under the taps to prevent breakages against the slate bottom. The lavatory itself has a tip-up basin which discharges directly into the sink, and the whole combination is cleanly, durable, and cheap.

It would serve no useful purpose to multiply my illustrated notices of these goods, as not only would much room be taken up in our columns, but the articles can themselves be seen in the Albert Embankment Show Rooms, in all their varieties. And if the owners of houses would only study these articles, there or elsewhere, more frequently, much good would accrue to the community. Often, for want of a bath, for instance, and a ready means of hot immersion, a little patient is lost; and more often, it may be said that for want of a proper housemaid's slop sink, the bed-room effete wastes are emptied hap-hazard down the closets, with a certainty of floor fouling, and introduced disease. Above all, each house, which is of such proportions as to require a housemaid, should have both bath and slop sinks each fitted up with cold and hot water, if only for humane reasons. It is almost incredible the number of servants, young girls especially, that are permanently ruined in health by the interminable carrying upstairs of cold, and especially of hot-water, to meet the necessities of even a moderately large household.

It is not a long step from the housemaid's slop sink, where bed-room slops of all kinds are emptied, to a properly constructed urinal, and to duly follow out these eclectic notices, it is now necessary to allude to the latter. It is a contrivance not to be

Improved Urinal. No. 17.

slighted with impunity, as many know; and it is a fortunate thing that these conveniences can now be fitted even inside the house without giving the least offence. In gentlemen's closets, and servants' resorts, the value in point of use is the same, though they greatly differ in the matter of monetary cost.

I give a specimen here of a plain slate urinal for two persons, with white flat back-lipped basins, the usual discharge junctions, and with a treadle arrangement for flushing out. Of course, the slate can be enamelled, or replaced by marble or tiled walls, and with a valve instead of a treadle form of flushing-out arrangement. In my opinion, no urinal should be fixed, save in a far-off yard—certainly not in, or near, the house precincts—without a self-acting treadle apparatus, thus providing a continuous flush to the convenience when in use.

THE

SANITARY RECORD.

JUNE 15, 1881.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

A YEAR'S WORK OF THE METROPOLITAN BOARD OF WORKS.

ALTHOUGH the Metropolitan Board of Works is scarcely classed among the sanitary authorities of London, yet the amount of sanitary work performed by that body is very large. During the past year there has not been so much of this kind of action taken as usual, because, in consequence of the enormous expense attending on the Board's operations under the Artizans' Dwellings Act, they have ceased to receive new schemes. They also decided in August last not to take action as regards fourteen areas which had been represented as unhealthy, by reason of the limited size of the area or of exceptional circumstances, so that there are only eight official representations now under consideration. One of these was dated September 1875, and others bear date in 1876, 1877, 1878, and 1879, so that they can scarcely be found fault with for too speedy action. Owing to the restrictions imposed by the Act, almost the only purchasers of the cleared ground have been the Peabody Trustees, who have bought five sites for £86,300. As regards the new streets projected by the Board, partly from financial reasons, but chiefly on account of the difficulty in providing accommodation for the working-classes displaced by the improvement, no large works have been carried out; and one notably, the new street from Tottenham Court Road to Charing Cross, is deferred until an amended Act can be obtained. During the year the Board has completed the work of freeing the metropolitan bridges from toll by the opening of the bridge over Deptford Creek at a cost of £44,800; of Wandsworth Bridge, at an outlay of above £53,000; of Putney Bridge at an expense of £58,000; and of Hammersmith Bridge at the cost of £112,500. Battersea and Putney Bridges are, however, so old that they must be rebuilt. A considerable outlay has also been required for the maintenance of the bridges previously purchased.

The Parks, Commons, and Open Spaces now under the control of the Board comprise an area of 1,676 acres, or rather more than two-and-a-half square miles out of the 122 square miles included within the area of the metropolis. As, however, there are parks and other open spaces not under the supervision of the Board, there is a much larger acreage open for the use of the public. There are certain private rights over some of the commons, so that the Board has arranged to purchase the rights of the lord of the manor over the Hackney Commons for the sum of £33,000. The maintenance of the whole of the open spaces cost nearly £18,000 during the year. The Board has opposed several Bills in Parliament, chiefly the 'Sea Water Supply to London Bill', which would have interfered very considerably with the streets and sewers of the metropolis, but, however, has now passed; the South Metropolitan Gas Company, the Southwark and Vauxhall Water Company, some Tramway Bills, the Alkali Acts Amendment Bill, and obtained some important modifications for the benefit of the public in those Bills which passed during the year. They also took important action as regards some Railway Bills, especially in the matter of the Metropolitan and District Metropolitan Extension Bill. The Board has also done good service to the public by continuing during the year the lighting of the Victoria Embankment and Waterloo Bridge by electricity, thus assisting in proving the practicability of giving a brilliant light at a cost comparatively little in excess of that of gas lights, viz., of 2½d. per light per hour.

By the Contagious Diseases Animals Act the Board is constituted the Local Authority in the metropolis, and employs a large staff to carry out its provisions, viz., eleven veterinary surgeons to act as cattle inspectors, and nine other officers who, however, also act under the Dairy, Cowsheds, and Milk-shops order. In 1880 there was not much disease amongst cattle, as only 378 were slaughtered by order of the Board's inspectors for pleuro-pneumonia, 13 for foot and mouth disease, and 90 pigs for swine disease. The expenditure under this Act was above £7,000. A very important work has been done under the Contagious Diseases (Animals) Act, by inspecting the premises occupied by cowkeepers and dairymen, to see that the cowsheds and dairies are kept clean, properly lighted, etc., and also have a sufficient water-supply, and for securing the cleanliness of milk stores, milk-vessels, and for protecting milk against infection. Under this order 8,003 persons have been registered, of whom 1,044 are cowkeepers. In carrying out their powers, the Board succeeded in abolishing

nearly 300 of the worst cowsheds, and obtaining alterations amounting almost to reconstruction of many others. As many as 10,596 inspections of cowsheds, and 12,975 of dairies, milk-stores, and milk-shops were made during the year. It is, however, unfortunate that the Board was unable to shut up or amend the objectionable cowsheds without exceeding the powers conferred upon them by the Act and the Order in Council, as by opposing the renewal of the licences instead of summoning the offenders for the £20 penalty, they assumed the authority possessed only by the boards and vestries of the metropolis. The Board has also, year by year, assisted in reducing the number of slaughter-houses in London from 1,429 to 903, and has not sanctioned any application for a new slaughter-house during the year. The premises occupied by knackers, soap-boilers, and tallow-melters, manure manufacturers, blood-boilers, tripe-boilers, bone-boilers, blood-driers, glue and size makers have been inspected, so that it is evident that the Metropolitan Board of Works should be looked upon as a sanitary authority, independently of the beneficial effects on the community exercised by the sewerage works which have been, with a few exceptions, so successfully carried out.

As paved streets impervious to rain have, to a very large extent, taken the place of fields and gardens since 1856, the main sewers have in many cases failed to carry off the storm waters, and many low-lying places have been consequently flooded. The Board, therefore, decided to make seven supplementary sewers, at an estimated cost of about £700,000, and obtained powers in their Money Act to borrow the sum of £300,000 for these additional main-drainage works. The necessary plans and specifications are being prepared for two sewers to take the overflow-water of the high-level sewer, and thus relieve parts of Brixton, Stockwell Park, and Loughborough Road from flooding, and the same course will be taken for other districts. This is a very necessary work, because not only has great injury been done to property, but also to health, by the overcharging of the sewers. The report also contains an interesting account of the causes of the formation of three banks in the Thames, which were attributed to a deposit of sewage matter, but which were chiefly produced by dredging operations, carried on by, or under the sanction of, the Conservators of the Thames.

Messrs. W. Smeaton and Sons, of the Eddystone Sanitary Engineering Works, have been informed that their exhibit at the Melbourne Exhibition has gained an award of the first class.

Ask for MARGERISON'S Registered White Windsor SOAP, Preston, 4½d. pound. *Court Journal* says, 'Possesses all the qualities desired in a good soap, and is unrivalled for all household purposes.' The *Bazaar* says, 'A very good and economical soap, we can strongly recommend it.' Try also our Superfine Toilet Soap. 2d. tablets.—(Advt.)

NOTES OF THE MONTH.

OVERCROWDING IN WHITECHAPEL.

The attention of the Whitechapel District Board of Works has been called to various complaints made to their sanitary department respecting the overcrowding and indecent occupation of houses in the district by the lodgment of emigrants who are in the course of transit from the Continent to America and other places. It appears the emigrants are consigned in large companies, numbering hundreds at a time, to agents in London, who, pending the departure of the Atlantic steamers, undertake to provide the people with food and lodging at a fixed price per head. The result is a great overcrowding of both sexes in the purlieus of Whitechapel, adjacent to the docks. Mr. Isaac Battram, Sanitary Inspector, has reported to the Whitechapel Board of Works that in company with the police authorities, he had visited several houses in which the emigrants were lodged and found them much overcrowded, there being in some instances as little as 190 cubic feet of space for each person. In a room at No. 19, Grace's Alley, he found a quantity of straw upon the floor, and upon this a number of emigrants of both sexes had been sleeping, at 4d. per head per night. There was not a particle of furniture in the room. Notices were ordered to be served upon the various persons who 'accommodate' these emigrants that each room only be permitted to be used by the number allowed by the law, and that a breach of the Lodging-house Regulations will involve prosecution by the local authorities. At a time like the present, when small-pox has assumed an epidemic form, it is doubly important that such a state of things should be put an end to at once.

JERRY BUILDINGS.

Confirmation comes to us, from several parts of the country, of the truth of the description we recently gave of the 'houses that Jerry builds'. Amongst other towns, Manchester unexpectedly appears as a sinner in this respect. A correspondent, writing with reference to certain cottages now being erected in a certain part of that city, says 'that cottages are being erected on undrained clay, which was used the year before last by the Corporation for depositing a large quantity of street sweepings; that no excavations have been made, but the flooring boards are only a few inches above the surface of the land; that the foundations (so-called) are only a few courses of brickwork set in trenches, which trenches, from the nature of the soil, at once fill with water, and thus the foundations are really laid in a ditch full of water; and that the Health Department, although admitting that such buildings must be unhealthy, say that they have no power to prevent their being erected. It is added that the Surveyor's Department of the Corporation stated that all requirements, both of the Act of Parliament and the Bye-laws had been complied with, so that it would appear to be in accordance with their ideas that houses should be built in this fashion. The Manchester Building Bye-laws seem, indeed, to be woefully deficient in several respects. Thus, they contain no clause as to the construction of buildings on a site previously used for depositing night-soil, refuse, or other offensive material, or any clause for causing the foundations to rest upon solid ground, or concrete, or for providing means for keeping out

damp and providing ventilation below the floors of the new buildings. It is much to be feared also that there exists some supineness on the part of the Surveyor's Department in enforcing even the small powers the bye-laws give. The 'jerry building' interests would seem to be too well represented in the City Council to reform and enforce the Building Bye-laws without a strong and determined expression of public opinion. The Manchester Society of Architects have indeed made for many years past efforts to rouse the attention of the Council to the necessity of consolidating and amending their bye-laws relating to building, but, as they state in their last annual report, 'they have found their efforts so coldly treated by that body, that they have unwillingly come to the conclusion that there exists neither a knowledge of the shortcomings of such regulations, as are to be found here and there in various local Acts of Parliament, etc., nor a willingness to accept assistance towards remedying their defects from those who are qualified to advise; and that further efforts in this direction must be spared till some combination of circumstances arises giving a fair hope of success'. It is greatly to be wished that a Building Act could be piloted through Parliament which would make the principles of the model bye-laws of the Local Government Board of universal application throughout the country.

NEWCASTLE INVALID LOAN SOCIETY.

One of the greatest hindrances to the convalescence of poor patients, often regretted by medical men, is the want of those comforts and conveniences which so materially assist invalids in restoration to health. The want is most urgently felt in our large towns. In Newcastle-on-Tyne an effort is being made to meet it, through the efforts of Miss Anna Proctor of Gosforth, who has been an invalid herself for many years, and is therefore but too well able to judge of the requirements of suffering humanity. A society has been formed to lend out to the deserving afflicted poor, free of cost, articles which would otherwise be beyond their reach. A depôt has been opened at the Newcastle Industrial Dwellings, under the charge of the wife of the agent, and a useful if not large collection of articles has been formed, comprising easy chairs, water-proofs, sheets, and cushions, bed-rests, tables, air-cushions of various sizes, apparatus for enemas, bed-pans, crutches, and clothing of every description, books and tracts on sanitary matters, and toys for children. The society is supported by subscriptions, and all the offices are honorary.

UNWHOLESOME FEEDING-BOTTLES.

Some feeding-bottles having a fetid odour were lately brought by Dr. du Mesnil from a *crèche* to the Paris Municipal Laboratory for examination. M. Fauvel found that the milk remaining in all smelt badly, was acid, and half coagulated; the globules were malformed, and numerous very lively bacteria, together with some vibrions, were present. On cutting open the caoutchouc tube throughout its length, coagulated milk with small organisms was met with; but a still more important fact was the presence in the nipple of a mass of vegetation of cryptogamic nature. Sown in whey, this developed considerably in a few days. A visitation of all the *crèches* was arranged by the police and medical authorities, and the following was the result:—Of 31 feeding-bottles examined in 10 *crèches*, 28 contained, in the nipple, the caoutchouc tube, and in some cases in the glass bottle, vegetations of the kind indicated, as well as bacteria, etc. Several that had been washed carefully, and were considered ready for use, still contained these cryptogams. Two feeding-bottles in a very bad state were found to contain pus and blood corpuscles; the children who had used them had injuries in the cavity of the mouth. It is thus probable that saliva enters the feeding-bottle, and its ferments are added to those of the milk. The acidity of the milk is attributed by M. Fauvel to the bacteria present. The influence of this condition of things in the development of intestinal affections, of which so many young infants become the victims, seems to call for serious investigation. Nothing requires the most scrupulous cleanliness more than feeding-bottles.

THE MOTION OF AIR IN DRAINS.

For the healthiness of dwellings it is obviously an important question whether the air of the drains, charged with vapours and small organisms, moves upwards or downwards. At the instance of Professor von Pettenkofer, Herr von Rozsahegyi has recently made experiments as to this point in the Ludwig and Max suburb of Munich, using sometimes vapour of sal ammoniac, sometimes smoke from flames, sometimes sulphuretted hydrogen gas, as indicators of the direction of the air-motion, while the strength of the draught was measured with a Recknagel anemometer. The principal results of the inquiry are these. The motion of the air in the Munich drains is much more downwards than upwards. The draught in the lower portion of the drain-system is stronger than in the upper. Upward currents occur but very seldom, and they are limited to very short portions of the drains. The prevailing direction of the wind has no marked influence on the direction and velocity of the air-current in drains. The temperature of the drain-air was, on an average, 3.2 deg. to 5.6 deg. Cent. lower than that in the open air, but the observed air movements in the drains are not explained by this. Where house-drains join street-drains the air goes oftener outwards than inwards, and this partial movement is also independent of the prevailing wind direction. The out and in motion at such places is not constant, but variable. Through these junctions, when near the houses, an exchange of air may occur between one house and another, if efficient water-traps are wanting. The predominant downward air-current appears to be due simply to the current of liquid matter. The experiments are to be repeated in winter, when the temperature in the drains is higher that in the open air.

THE SANITARY CONDITION OF MADEIRA.

In the United States National Board of Health Bulletin is printed a report from Dr. Julius Goldschmidt, a medical practitioner in Madeira, giving a statement as to the sanitary condition of the island for 1880, which may interest those who look to Madeira as a health resort. The general sanitary condition of the island, and especially of Funchal, we learn from the report, is very satisfactory, though there is an utter absence of public and private hygienic regulations. The average death-rate for the whole island per annum does not exceed 20, or for Funchal 24.4 per 1,000. Epidemic diseases are very rare. Six years ago small-pox prevailed, and there were altogether 1,000 deaths from it, which was not surprising, as the people are generally opposed to vaccination, either through ignorance or prejudice. Scarlet fever and diphtheria appear only sporadically,

and in much milder form than in other climates. Measles and whooping-cough have been occasionally observed, but are very seldom fatal. In spring and in autumn gastric and typhoid fevers often appear, chiefly among the poorer classes, who live in very crowded habitations and drink the water from the irrigating canals, polluted by the drainage of houses. Heart diseases are frequent, as steepness of the roads prevents the general use of vehicles, and burdens are usually carried up and down the hills by men. Acute lung diseases are also observed among the people of the mountain districts, who are exposed to great changes of temperature and atmospheric influences in their daily journeys. But, notwithstanding the many predisposing causes of consumption to be found among the poor, even that class is not very liable to the disease in Madeira. Among the foreign residents who live in comfort, but are mostly descended from phthisical parents, only one death from consumption has been registered in 15 years. The death-rate among children is high in proportion to the general mortality, mainly caused by the poverty of the people. Leprosy was supposed to have been introduced by the first settlers, and is still found in the southern and western parts of the island. The hospital for this disease usually contains from seven to fifteen patients, but it is estimated that between 400 and 500 persons on the island may be affected with leprosy.

PUBLIC PARKS.

Prof. S. E. Baldwin recently gave a lecture at the Sheffield Scientific School, New Haven, U.S.A., in which he said that a large city needs both squares and parks. The square is a breathing hole, a necessary part of a city. The park is an interruption of the city, a playground. 'Every city is a sort of gigantic human being. It has its own individuality, history, ambitions, life—a hard driven life, in which business and pleasure are generally kept quite separate. A dirty life, too. The modern city is built on coal. It is a great smoker. Happy is the city which is wise enough to have a broad wholesome park, where it can take its ease and be clean. Every park is a preacher, and the sermon may be none the worse because we don't know that we are listening to it.'

THE SALICYZATION OF FOOD.

There has been much talk about the French ministerial circular of 7th February 1881, which prohibits the sale of any alimentary substances containing salicylic acid. It is generally considered by the public that salicylic acid in small doses has no important action on the animal economy, and that it may prevent the fermentation of liquids which, without its addition, run great risk of change. Lately wine and beer have been treated with large doses of salicylic acid. In the *Revue d'Hygiène*, M. Vallin has written an excellent article in defence of the *Conseil de Salubrité* which brought in this measure. His arguments are, specially, that it is possible to do without this salt; that it is especially products of very inferior quality which necessitate its employment; that if the producer and the vendor add it at their pleasure, it is used in enormous quantities; frequently more than 1 gramme, in one case 3 gr. 50 per litre of wine. If, therefore, the provisions consumed by the working classes be taken into account, it will be seen that a French workman might absorb with his food 4 grammes daily of salicylic acid; therefore, far from being inoffensive, the use of salicylic acid is injurious, especially as its anaphrodisiac action is very pronounced. If these data be accepted, the decision of the *Conseil de Salubrité* must meet with entire approbation. Still, while regretting not to have seen a maximum fixed which would permit of the employment of useful doses, Dr. Galippe embodies the following opinions in a long article in the *Journal des Connaisances Medicales* intended to refute M. Vallin's article. According to him the salicyzation of wine is not so useless as M. Vallin asserts. It may be done usefully with moderate doses not injurious to the consumer. M. Galippe thinks that the enormous amount of salicylic acid contained in food may have some relation to errors in certain processes of dosage. Finally, it may be asked if it would not be wiser, not to decree the absolute suppression of salicylic acid, but to regulate its employment.

SANITARY WORK AT HARBORNE.

In his annual report to the Harborne Local Board, Mr. Worrall, the sanitary inspector, reports satisfactory activity in the repression of nuisances and in the removal of night-soil. A total of 338 nuisances were dealt with during 1880, as compared with 163 in the previous year, and the quantity of night-soil carted away amounted to about 1,400 tons. Mr. Worrall recommends more efficient ventilation of the sewers, in which there is often much pressure of gas in consequence of the connection with the Birmingham sewers, and he urges scrutiny by householders of the sanitary arrangements of their houses.

EFFLUVIA FROM SEWER GRATINGS IN SOUTH HACKNEY AND HOMERTON.

On Friday, the 28th ult., an influential deputation, including the two members for the Borough of Hackney, waited upon the Metropolitan Board of Works respecting the noxious effluvia which are very frequently given off from the gratings of the large (Wick Road) sewer under the control of the Board. The smell, which was said to be of a most offensive and penetrating character, is not only given off at the gratings, but finds its way into the houses through the traps. Mr. Fawcett, who addressed the Board, said that he had been informed by Dr. Tripe that this subject had been under consideration by the Board on several occasions, and that persons had been appointed to watch the sewers, during the whole of which time the smells had ceased, but had recurred again on the watch being discontinued. The memorial, which was signed by 1350 persons, was reported to the Works Committee, where it is to be hoped it will receive due attention, especially as the smell is said to affect from 6000 to 7000 people. The Metropolitan Board some time since ordered the gratings to be trapped, shutting in the smell, instead of erecting ventilating shafting shafts to carry it off above the house-tops. It certainly seems strange that a nuisance of this kind should go on for years without the chemist or engineer to the Board being able to ascertain from what manufactory it is poured into the sewer. The penalties are sufficient to check the practice, if the offenders could be detected.

The Crown Princess of Germany has accepted the position of patroness of the Sanitary Association, presided over by Doctor Falk, the former Minister of Public Worship.

THE SANITARY RECORD

ILLUSTRATED GUIDE

TO SELECT EXHIBITS

AT THE APPROACHING

SANITARY AND MEDICAL EXHIBITION

AT SOUTH KENSINGTON.

PRELIMINARY NOTICE.

FROM the 16th July to the 15th August the medical profession from all parts of the Kingdom, the Continent, and America, will be flocking to the Metropolis to attend the great International Medical Congress to be opened on the above named date. Sanitarians too, will in all probability muster in as great force, attracted in some measure by the Exhibition to be opened simultaneously with the meeting of medical scientists. Judging from the number of entries at South Kensington, and the diversity of the exhibits, there will be few appliances connected with medicine, surgery, sanitation, or domestic utility, bordering upon the lines of public health, that will not be shown or represented in the great building at South Kensington. Unfortunately, the full *repertoire* of exhibits, as a rule, is not completed until the last moment, but we shall endeavour, by diligent inquiry, to place before our readers as complete a description as circumstances will permit before the Exhibition opens, of the array of novelties and useful appendages that will be brought together for their inspection. These descriptions we purpose to reprint in the form of an independent pamphlet, and to present the work gratuitously to every visitor to the Exhibition. The SANITARY RECORD and the LONDON MEDICAL RECORD will be represented in the building, and from our stand the current numbers of each Journal may be obtained on payment, in addition to our gratuitous 'Illustrated Guide'. We request all the exhibitors to supply us with a list of their intended exhibits, and volunteer to illustrate any specialities worthy of notice, free of charge; therefore, on themselves will rest the onus if our descriptive pamphlet fall short of what we are desirous it should be. We shall now proceed to describe the Exhibits, so far as the particulars have reached us.

The ANTHRACITE COAL COMPANY, 19, Spring Street, Paddington, will exhibit a large block of the purest anthracite coal, an article on which appeared in the number of the SANITARY RECORD for May 15th. Several of the stoves that will be exhibited will be fed with this smokeless fuel.

Messrs. CHORLTON & DUGDALE, Blackfriars Street, Manchester, will be represented by their celebrated 'Excelsior' Spring Mattress, exhibited on a bedstead. To this mattress

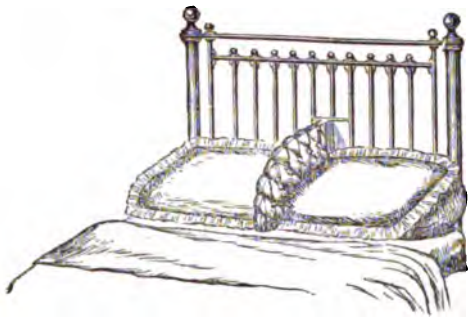
has already been accorded a full description in a previous number of the SANITARY RECORD, and we need only recommend the public to examine it for themselves. As a strong, useful, and universal hygienic appliance for the bedstead, we doubt if it can be excelled, and its diffused elasticity adapts itself to the slightest movement of the body.—The Invalid, Camp, or Occasional Bedstead, made entirely of iron, with the Excelsior Mattress fixed to it, is of a similar character, excepting that the mattress forms a portion of the bedstead itself.—The Excelsior Bedstead, with appliance for raising a patient to any angle, is a most meritorious invention. A

patient reclining upon this bedstead is raised or lowered painlessly, easily, and immediately, by one person; during the operation the entire length of the spine is evenly supported. The benefit of this will be at once realised, if the excruciating pain often experienced by the invalid when lifted by hand, or held in uneasy position by a chair, or packing of pillows, be borne in mind. The mechanical construction provides for the moveable back and shoulder-rest being secured in any desired position.—An Asylum Bed, for epileptic patients, is of a somewhat similar character.—A Ship's Berth, on the Excelsior 'lines', a Portable Cabinet Bedstead, the Matlock Invalid Couch, adjustable to various

positions, and the Matlock Bedstead, complete the bedstead exhibits.—The Excelsior Invalid Chair, with adjustable leg

rest, will be found a real luxury to many patients.—The Patent Pillow Divider, to which a cup rest can be attached, is another invention of Messrs. Chorlton & Dugdale that should find favour with the profession generally. Dr. Richardson, in an article in *Good Words*, April 1880, entitled 'Health at Home', says: 'At some time or other the breath of one of the sleepers must in some degree affect

the other—the breath is heavy, disagreeable—it may be so intolerable that in waking hours, when the senses are alive to it, it would be sickening soon after a short exposure to

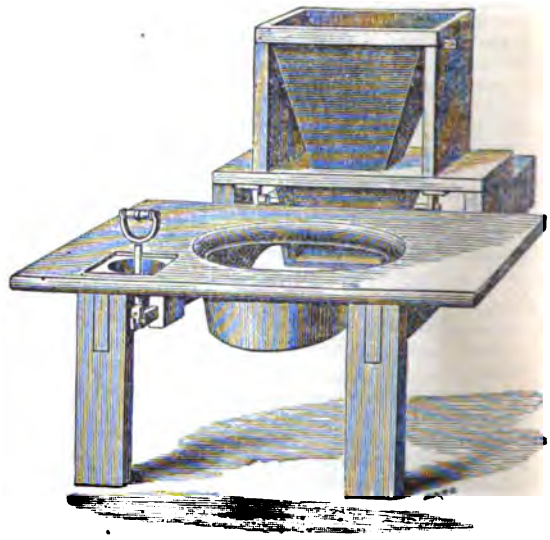


it. Here, in bed, with the senses locked up, the disagreeable odour may not be realised, but, assuredly, because it is not detected, it is not less injurious.

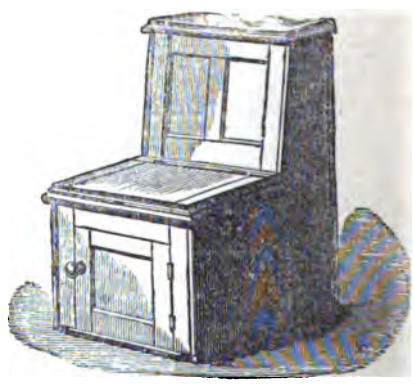
Mr. A. CLARKE will exhibit a variety of his popular pneumatic bells, made under his patent, No. 1599 of the year 1879. The improvement in Mr. Clarke's patent consists in dispensing with certain objectionable features connected with pneumatic bells of other inventors. Amongst these we may mention that the inventor makes his airholder of a cup form, *i.e.*, entirely open on the flat side, so that it can be readily and thoroughly cleaned out before being fixed for use, and of such a shape and thickness that it will not collapse with usage. It also dispenses with the spring inside the airholder, except for long distances, when a pull handle is used; a spring is applied inside the airholder, *but does not touch it in any part*. Should the airholder at any time require to be removed, it can be without injury to the wall or paper. The cup-shaped airholder is closed on the flat side by a plate of metal or wood, against which the edges abut closely without being clamped thereto, the plate may be the top or bottom of the box in which the airholder is contained. For short distances, the air-tube communicates with the interior of the airholder through this plate. For long distances, the airholder is open to the atmosphere through holes in this said plate, and the air tube communicates with the metal box in which the airholder is contained, so that in either case no binding or other form of metal connection with the india-rubber is necessary. This invention also comprises improvements whereby the valves obliged to be used to prevent the return of the air in long tubes are dispensed with. By having a pin-hole in the air tube, close to the air vessel of the bell or indicator, 'for the inlet and egress of air,' the compression of the airholder by the pull handle (Fig. 4) creates a partial vacuum in the tube and draws in air at the said pin-hole; when the pull handle is released, the expansion of the india-rubber airholder compresses the air behind it, causing it to act on the air vessel of the bell or indicator, whilst the surplus is escaping at the pin-hole; thus, however quickly the pull handle may be released, the bell cannot fail to be acted on.

Messrs. WM. WOOLLAMS & CO., manufacturing paper-stainers, 110, High Street, near Manchester Square, London, W., will send a selection of wall papers, all *guaranteed* to be *free from arsenic*, including papers of bright tints, usually thought to be necessarily arsenical, and others of almost every shade of the present fashionable low toned colours, ranging in quality from the cheapest and most simple bed-room papers, up to the most elaborate and richly decorated, suitable for the handsomest reception rooms. They will also show their 'Patent Embossed Flock' papers, in which the flock is modelled in relief, like carving, and compressed under heavy pressure, being thereby rendered much more dense than ordinary flock, and less likely to absorb noxious vapours or to retain dust. These papers are of especial value for ceiling decoration, as well as for walls. Messrs. Wm. Woollams and Co. desire to call special attention to their sole address, as above, to prevent mistakes and disappointment.

MOULE'S EARTH CLOSET COMPANY, 5 Garrick Street, Covent Garden, will exhibit their Pull-up Earth Closet Apparatus, No. 4A in Company's catalogue: On pulling the plug a pint and a half of earth is thrown into the receptacle under the seat.—Pull-up Apparatus, No. 9 in Company's list: Similar to above, except that the contents



of receptacle are hidden by a tray covered by dry, unused earth which, after use, is depressed by pulling the plug, the action discharging what rested upon it into the receptacle. —A bed, bath, or dressing-room commode, quite portable,

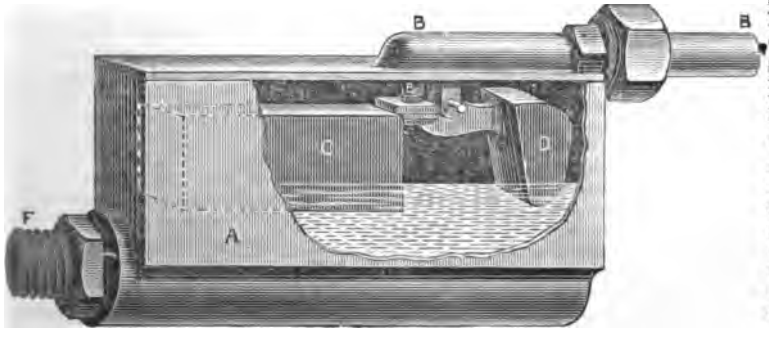


fitted with an apparatus similar to the first one mentioned above.—Model of an up-stairs closet, showing how it can be attended to for filling and emptying purposes from a garden, without the attendant ever entering the house: A simple lift carries up the earth and discharges it into the hoppers of the various upstair closets, the receptacles being brought down by an arrangement of chains and pullies; the whole being immediately accessible by opening a door in garden wall of house.—Model showing how a downstairs or out of doors closet may be arranged so that filling the hopper and emptying the receptacle may be effected from behind, the closet not being entered at any time.—A collection of receptacles larger than a pail to be used, when that is too small.

The 'ALBISSIMA' PAINT COMPANY, 24, Lime Street, E.C., intend sending a collection of their beautiful pure white paints, which have gained a vast amount of popularity. The extreme purity of this compound is expressed by its name, and the company have not without good reason adopted the 'Lily' as their trade mark. Its component parts are zinc, but it is distinguished from other pigments of which that metal

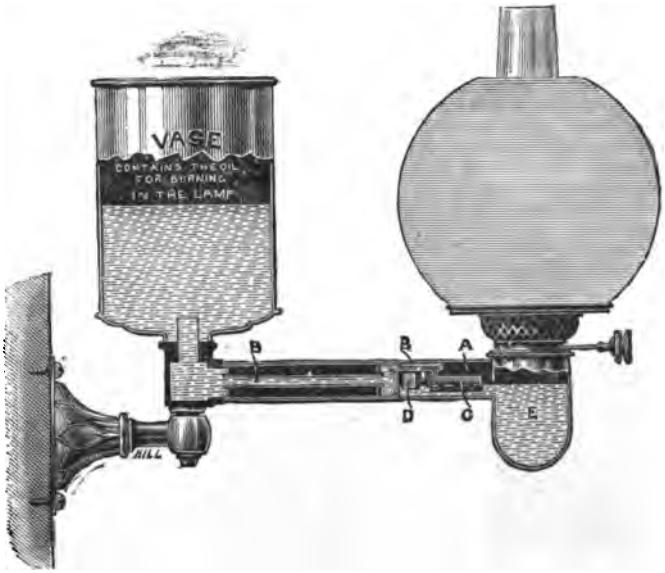
forms the basis, by its covering power being much greater. In this feature it exceeds any white lead in the market to the extent of from twenty-five to fifty per cent., which we believe has been effectually proved by the trade. It is absolutely non-poisonous, and this is a great consideration to be borne in mind, as the health of workmen will not be affected by its use; another boon is also obtained in so far that it is virtually without smell, so that the inmates of a house may live in comfort while renovations are being carried out, if Albissima form the groundwork of the pigments used. It is almost unnecessary to add, after what we have said, that it is of the purest white, and devoid of that bluish tint which zinc paints of the present day too often possess. Its colour is unaffected by gas, or any impure atmosphere; ordinary chemical re-agents appear to be powerless in affecting it, and in the neighbourhood of the sea it has been found to surpass all others in appearance and general lasting qualities. There appears also to be a softness or elasticity in its nature that renders cleaning much more easy without destroying its vitality. Owing to its smoothness and fineness it works much freer under the brush, thus securing economy in time and labour, and the brush does not require daily cleansing, nor is straining necessary, thus loss of weight, no mean factor in such cases, is prevented. Another advantage is that when a cask is opened it does not require to be kept under water. Metallic surfaces are protected by its use without being attacked—as in white-lead pigments. As regards the admixture of colours, beautiful tints are obtained by using vermillion and French ultra-marine, which has baffled the best mixers who use white-lead, but to keep it as a pure pigment, arsenical colours should not be used with it, almost any tint required being obtainable by blending non-noxious ones. As a proof of its purity and beauty in colour, it is being largely used by artists, particularly for stucco, and Professor Church, R.A., is loud in his praises of it. Apart from the economical features already enumerated, one of the qualities sent out is much lower in price than white lead, and the very finest samples do not exceed it in cost. The Albissima paints may be obtained at the depot agents of the company, Messrs. Randall Brothers, Imperial Wharf, Bankside, E.C., Price & Co., Ebury Street, S.W., A. Emanuel & Son, Marylebone Lane, W., Brooks & Phillips, Paddington Green, W., Barnard & Son, Winsley Street, W., and Urquhart, Edgeware Road, W.

THE LIBRA VALVE AND LAMP WORKS, W. W. Hopkinson's patent, 141, Fetter Lane, will exhibit the 'Libra' Valve and Lamp, the former intended to regulate the supply of water to kitchen boilers, filters, etc., in place of the unsightly and cumbersome ball cock, etc. Our illustration



describes the invention. The metal box A in which the Libra Valve operates, is fixed at a level with the required height of water in the kitchen-boiler, or filter, etc., or cistern for flushing purposes. The inlet B has a cap and lining for connecting it to the supply pipe; the outlet F is tapped to fit iron barrel. Its size is 5½ inches long, 3 inches deep, 2 inches broad. There is no leakage from the Libra Valve, and it is for use instead of a ball-cock and cistern. As the water approaches the required height, the float C for actuating the valve rises very readily; the buoyancy of the float being caused by the counterbalance D, which renders the valve so very sensitive that the supply of water is regulated with minute accuracy, admitting only the exact quantity of water that is withdrawn. The Libra cistern for flushing purposes contains a very simple water-waste preventer.

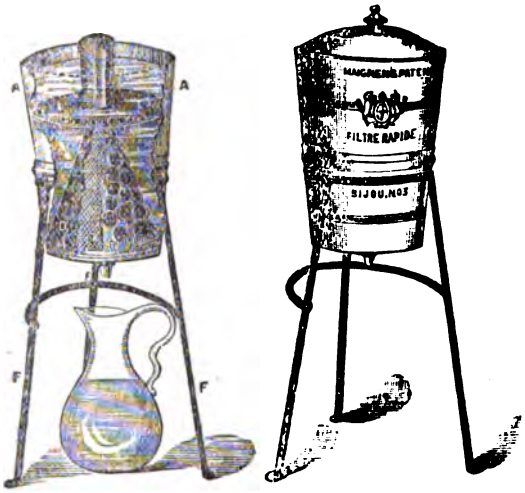
THE LIBRA LAMP brings the same invention into operation in an ingenious and effective manner, and may be utilised in a variety of ways. Our illustration depicts a bracket lamp, the oil-fount being connected with it at the end of the bracket, but the oil may be placed in a tank at any height or distance from the lamp. In each case the



oil flows through the pipe B to the lamp. The supply is regulated by the Libra Valve fixed in the arm A. The buoyancy of the float C for actuating the valve is caused by the counterbalance D, which renders the valve so very sensitive that the supply of oil is regulated and kept up to the proper level in the lamp-fount E with minute accuracy, the valve admitting only as much oil as is consumed while the lamp is burning. The Libra Valve is applied to standards, two-light table lamps, chandeliers, billiard lights, etc., with the vase in the centre, which when required is made to supply a great number of lights; it is also fitted to Queen's reading lamps, street lamps, cooking and heating stoves, etc., and is a desideratum for green-houses where a constant heat is required, as well as for light-houses requiring continuous light. The method of applying the Libra Valve to the Libra Lamp is very simple, easily performed, and effective. The vase has a hinged cover, and is fitted with a filter to prevent particles of impurity entering the lamp. The vases can be made to other designs and the arms to any length. When the oil is conveyed through pipes from a tank placed at a distance from the lamp, a stop-cock, with the handle reaching to the top of the tank, is attached to the pipe inside the tank, with a filter. The joints of the pipes are soldered, so that there is no leakage of oil from them. The Libra Lamp

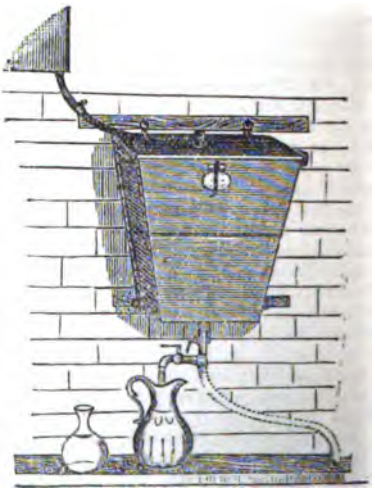
has the following advantages :—It saves much of the time and trouble all other lamps require for cleaning, and filling, and trimming; the Libra Lamp burns without re-trimming from 70 to 100 hours, continuous or otherwise, and the vase can be refilled with oil while the lamp is burning without affecting the light in any way, and without danger. The lamp-fount is small and casts but little shadow, the Libra Valve constantly admitting exactly as much oil as the lamp requires. The wick does not get burnt to anything approaching the same extent as when the oil-level falls, nor does the light diminish in brilliancy. It cannot become heated, and thus danger from explosion is avoided. The effect of the oil-level falling as in other lamps, can be illustrated by the burning of a tallow-candle. As the tallow is consumed it becomes lower, the wick burns, and the light diminishes in brilliancy; but if the tallow could be replaced as it is consumed, and kept up to its original height, the wick of the candle would not get so much burnt, nor would the light diminish as it does.

M. MAIGNEN, 23, Great Tower Street, will be present with his 'Filtre Rapide', which has already been mentioned in these columns. Since the patent was first taken out for this invention the patentee has laboured incessantly to make it as perfect as possible, and it will be shown at the Exhibition in its most approved form. M. Maignen disapproves of the hitherto existing notions as to what a filter should be, and starts with the argument that the storage of filtered water is objectionable, and that it should be filtered as required for use. For this purpose he provides an earthen receptacle, as shown in the accompanying drawing, having a loose perforated cone inside, also of earthenware, which is covered with a cup of the best asbestos cloth. After



experimenting with various substances, this material has been proved to be the best for the purpose, as it does not wear out or decay, is purer, and more readily cleansed than any other. When filled with water, a quantity of a finely powdered substance patented by the inventor, called 'Carbo calcis', mainly composed of the finest animal charcoal, is thrown in, and this, in its endeavours to escape with the water through the covering and the cone, is drawn by the water to the asbestos, to which it adheres, and in a short time we have a thick covering of this substance firmly adhering to the asbestos cap, through and over which every drop of water must permeate ere it passes out at the bottom, and arresting every particle of impurity it may contain. In addition to this, an air-pipe communicating with the water is provided, having a cup at the top in which is placed a small ball of cotton wool, which purifies it ere it comes in contact with the fluid. The action of the filter is rapid, and by the means described a stream of bright, pure, and sparkling water, which may almost be called aërated, is given off. The filter is entirely under the control of the user, and all that is required at any time to cleanse it, is to take out the cone, take off the asbestos covering, wash the whole, and replace them, or an additional covering of asbestos may be kept in store, to put on while the other is being cleansed. These filters are made in various sizes, from a small one, called a 'Bijou', upwards, and if a larger quantity of water is required at any time, the filter can be placed over a glass or earthenware barrel, as in the accompanying drawing, and

allowed to filter into it, and be used as required. M. Maignen also provides us with a main service filter on the same principle, which we also illustrate. This is made of a strong metallic material, such as galvanised iron, etc., and in place of the cone, filtering frames, covered with the same substance, and communicating by taps to the draw-off pipe, so that every drop of water used in the household may



be purified. The 'Carbo calcis' is so inexpensive that it is not worth while to save it after each washing, but to use a fresh supply each time. The 'Carbo calcis' has also the property of tendency to soften the water, and, according to

the quantity used, this is accomplished in a greater or less degree.

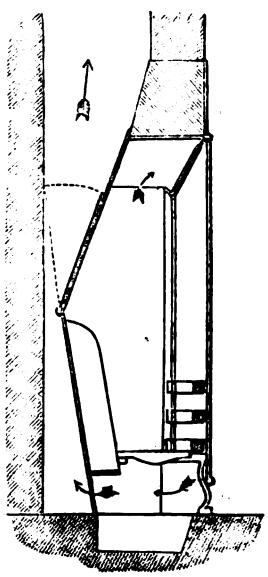
Messrs. CAPPER, SON, & Co., 69, Gracechurch Street, will be represented by Pearson's Patent Trapless 'Twin Basin' Water-Closet, made in one piece of pure white earthenware. Also, recently patented and attached to the basins, Brian Jones's Patent Joint, for connecting the closet with the soil-pipe. This Joint effectually prevents the escape of sewer gas, and it also prevents the possibility of the joint being eaten through by rats or mice, or from perishing, or being broken, to all of which defects the usual joint is subject. It hermetically seals the closet to the soil-pipe, and is the most effectual guarantee against the escape of sewer gas. It is simple in construction, and is entirely without that complicated mechanism by which other closets are worked, and consequently less liable to get out of order. The very important features, however, being cleanliness and the absolute protection against foul air from the sewer. This contrivance is without wires, without cranks, and without underground traps. It has no fly-pan, nor any container. It protects the cistern water from being contaminated by sewer gas. Being without obstructive gear, the contents of the basin pass freely to the sewer. As a sanitary appliance this closet is, without doubt, one of the best produced; it has been tested and approved by the highest sanitary authorities, by architects, the medical profession, and others. It is made in a variety of designs and sizes.

Messrs. STEEL & GARLAND, Wharncliffe Works, Sheffield, and Holborn Viaduct, will exhibit their Wharncliffe Patent Grate and Coal-Economiser, which was described in the SANITARY RECORD for May 15, 1881, and commends itself to all who interest themselves in the question of heating apartments on the most advantageous and satisfactory principles. Without recapitulating more than is necessary for our present purpose, we may note that instead of the fire-box being placed in a recess some distance behind the plane of the stove-front and chimney jambs, all the heating-surface stands out prominently in the room, thus utilising the heat that would otherwise escape and be lost up the chimney. The ornamental canopy forms of itself a complete hot-air chamber, pure cold air being introduced at the back, or underneath, by a pipe four inches

in diameter, which passes up the sides and back through a series of gills, and, having become heated in its passage, proceeds through a perforation at the top of the canopy, imparting a genial and equable glow of fresh warm air through the apartment. The extreme simplicity of this arrangement is apparent, there being no valve or movements of any kind tending to possible derangement. A great advantage is that the 'Wharncliffe' grate requires no fixing, as it is complete in itself, and even the chimney-breast may be dispensed with. Thorough and efficient ventilation is secured by the admission from without of pure cold air, passed through the hot-air chamber. An important recommendation is, that from the smallest quantity of fuel burnt in this grate the maximum of heat is generated. A room of ordinary size (twenty-four feet by eighteen feet) can be efficiently warmed by the consumption of so small a quantity as one pound of coal per hour, the saving, as compared with the consumption of an ordinary register stove, being equivalent to fully 75 per cent. The temperature of a room of the above size can be raised with ten pounds of fuel from 55 to 75 deg. of heat when desired. Messrs. Steel & Garland have just issued a new design, shown by the illustration. This grate is made on the slow-combustion principle, now so much in request; other forms and sizes are manufactured, and the 'Wharncliffe' is also made as a ship saloon stove, with brass mountings and doors, having guard, fender, etc., complete. Messrs. Steel and Garland have obtained medals at the Exhibitions held at Paris, Philadelphia, London, and Award of the Highest Merit at the late Melbourne Exhibition. They will also exhibit a very handsome Hob Grate, designed by the late B. J. Talbert, and examples of their Holborn and other Slow-Combustion and Ventilating Grates.

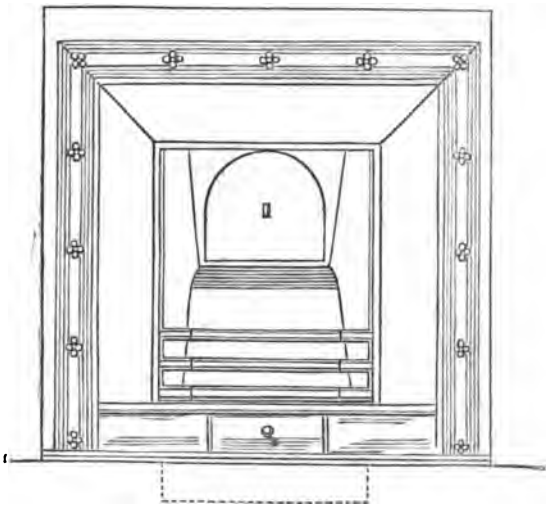
Messrs. BANNER, BROS. & Co., Billiter Square, E.C., will exhibit models of Banner's System of Sanitation, showing Soil-pipe, House-drain, and Sewer Ventilated, Railway and other Carriage Ventilators, and Tunnel Ventilation. A Brass Shaft-Sewer ventilated by heated Cone and Cowl combined; Ventilation by Clock-work; a Flexible Tube one inch by sixty feet long, to show power of Cowls; Drain-Traps—Lever, Double Dip, and Single Dip; Cowls, Rotating and Fixed Finials, Exhaust and Down-Draught Ventilators and Water-Closet. Also Plans of Guy's Hospital, Boro'; Duke of Abercorn's, Baron's Court; Marquis of Exeter's, Burghley; Marquis of Headfort's, Headfort House; Builders' Exchange, 206 Holborn, and John Banner's, Sydenham Hill; Drawings in Section, etc., of Lever Drain-Trap, Double Dip-Trap, Single Dip-Trap, Ventilating Cowls and Fixed Finials, showing Drains, etc., in large sizes.

Messrs. DEANE & Co., London Bridge, will exhibit a new grate, Crane's patent, to burn either bituminous or anthracite coal. The grate is ingeniously constructed, easily managed, and is said, from the great draught capable of being created, to be a sure cure for smoky chimneys. In



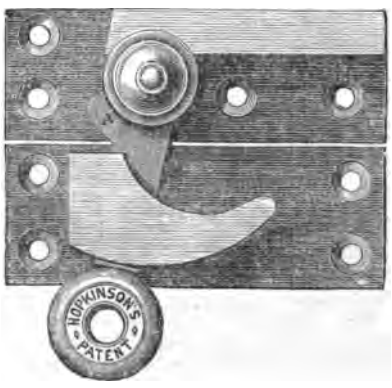
burning anthracite coal it is necessarily non-smokeless, but bituminous coal may be burnt with the best results, that is to say, that by the arrangement of construction a large amount of smoke is consumed, and a clean hearth is always presented.

Our first illustration is a section, and, in explanation, we may say that the fire-box is formed of Stourbridge lumps, fitted into a cast iron frame, so constructed as to form at the back of the side lumps side flues communicating with the bottom of the stove. A register door is fitted above the low back lump. When this register door is closed a strong draught is created, and the smoke, and other products of combustion, are conveyed down the side flues and directly under the fire, the greater part being again drawn through the fire, and the remainder carried into the chimney through an opening below the level of the fire. The front is closed by a raised hearth, as indicated in the drawing. When the fire is well alight, the register door may be opened, and the anthracite is then burned as in an ordinary grate. The stove may be seen in use at Messrs. Deane's show-rooms, 46, King William Street, London Bridge, E.C. Our second drawing represents a full front



view or elevation of this grate, and, having seen it in action, we can add our testimony as to the bright and cheerful fire produced, and the very little attention required to keep it up, one feeding after the first lighting being generally sufficient for the entire day.

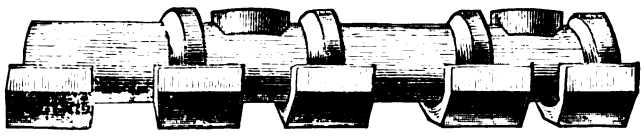
Messrs. TONKS & SON, the eminent domestic and general brassfounders, of Moseley Street, Birmingham, will send an interesting assortment of domestic brassfoundry, including a variety of patent bolts and door chains, bookshelf fittings, casement stays, lock furniture, sash fasteners, patent sash line, ventilators, and window blind furniture. We select Hopkinson's Patent Sash Fastener for illustration, a simple and inexpensive article, securing absolute



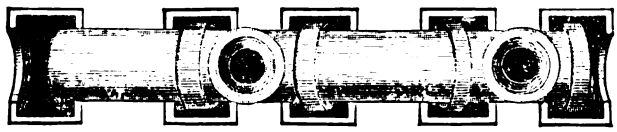
safety from being opened from the outside. In appearance, it is the same as the ordinary sash fastener, with a projection, A, on the left of the arm, forming the patent guard, which, when the window is fastened, lies up to and immediately behind the opening between the sashes. When any instrument is thrust through the opening to force back the arm, the patent guard instantaneously closing on, and tightly wedging it, effectually prevents the instrument from forcing open the fastener. Being without complicated parts, it is not liable to get out of order. For the same reason, it is not expensive, and can be sold at about the same price as the ordinary fastener. Their Patent Sash-Opener and Automatic Sash Fastener is another article worthy of commendation that will be exhibited. It is intended for opening window sashes and closing them, by means of two pairs of lines, terminating with wooden handles, each having two rings of vulcanised India-rubber to protect the window frame and glass. At the same time, this invention allows a certain amount of ventilation with security, as the window may be opened to a given height, and automatically locked by the apparatus. However exposed the situation, the room may be left with perfect safety, as the sash cannot be operated upon from the outside, and it will not open sufficiently wide for the smallest boy to enter. Hookham's Patent Steel Sash Line and Picture Cord is another of the specialities sent by this firm. The sash line, which is now pretty generally known, is made of flat spring steel, and is bound round with copper wire. It possesses great elasticity and immense strength, is much neater in appearance than other sash lines, and is proof against breaking. The picture cord is made on a similar principle, and of various sizes. The core is of one or more strands of the best pianoforte string wire, covered with a close binding of waterproofed cotton and ormolu wire; and as every length is subjected to a testing strain before it is sent out, it will bear a great weight or strain for an almost indefinite period. Some simple and ingenious fasteners for connecting the wire to the picture ring forms a portion of the arrangement, and enables pictures to be hung securely and rapidly.

Messrs. MAGUIRE & SON, Dawson Street, Dublin, will exhibit an extensive collection of sanitary appliances, prominent amongst which will be their patent drain joint, as described in the SANITARY RECORD. In this joint the firm claim to have secured, by simple means, everything that can be desired in a drain, at but slight increase of cost. As the drawings show, they provide a hollow cradle of glazed earthenware, in which the pipe and the socket of next drain rests. This has the effect—1st. Of holding the pipe and socket concentric, so that a much more perfect and durable cement-joint can be made than by any other system, the joint being equally spaced all round, without the use of wood wedges, so often used by drain-layers, which wedges rot away in time, leaving a hole under the socket for leakage of sewage. 2nd. It enables the joint to be got at all round, as it holds the pipes steady and even, instead of lying loosely on the ground. 3rd. It enables a second and independent cement-joint to be made on the lower half of the socket where the sewage runs, by pouring in liquid cement round the first joint after it has properly set fast, making a perfectly sound staunch joint, independent of the workman's care, and open to the inspection of all concerned. In addition to this, they provide an open inspection hole, round or oval, with loose cover, on every alternate length of drain-pipe, each hole affording easy means of smoothing perfectly the interior of two joints right and left, and giving perfect facility for the careful inspection of every joint in the drain after it has been laid and finished. Wherever it is desirable, this patent contemplates the use of T pieces, having the branches carried up to the ground level, with air-tight stoppers and covers for occasional inspection of interior of drain when in use, and for enabling the drain to be got at easily if required. This invention has the great advantage of utilising the ordinary cheap forms of pipes in conjunction with the firm's Patent Cradles. The system has been protected by patent, and the Patent Cradles can be had separately wherever contractors may desire to use their own drain-pipes, should they be found to fit. To show the advantage of Maguire's patent, we append an illustration of the old drain-pipe, showing the danger and insecurity that often occurs from

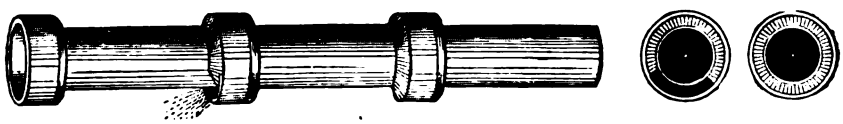
their use, and we cannot too highly commend Messrs. Maguire and Son's invention. This sketch shows three lengths of socket pipes laid—(*a*) the socket open; (*b*) an imperfect joint; (*c*) a perfect joint, as laid generally under the old system. The Patent Self-acting Flushing Tank made by this firm, is an article that has attained just celebrity, and was introduced to meet the necessity, admitted



Elevation of Maguire's Patent Perfect Safety-Joint Drain.

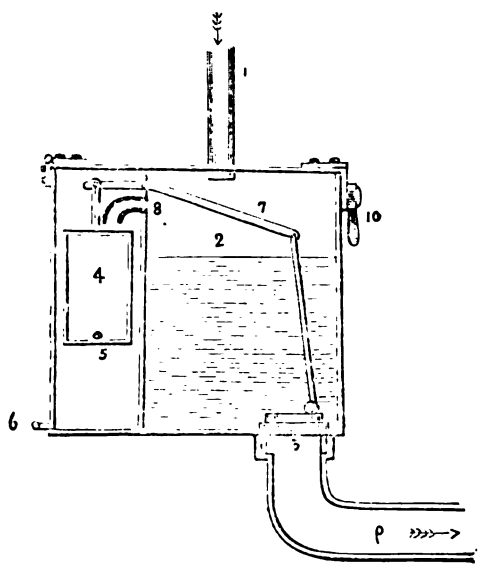


Plan of Maguire's Patent Perfect Safety-Joint Drain.



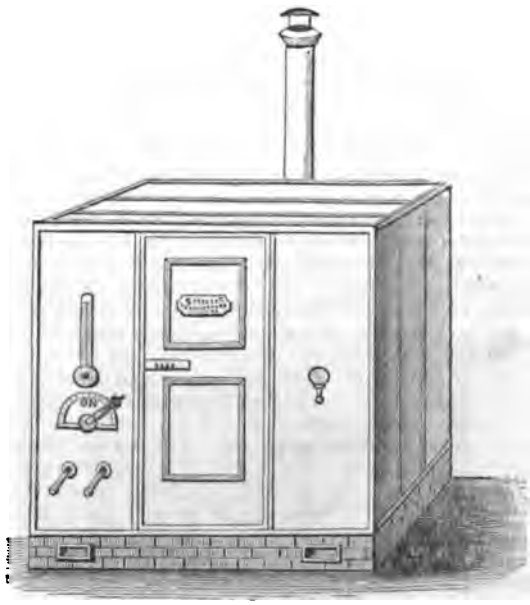
Sketch of Ordinary Defective Drain Pipes.

on all hands, of effectually flushing drains periodically. This cannot be effected by the small amount of water used in closets, and even when bath water is discharged, the outlet-pipe is generally far too small to produce a thorough scour. Hand Flushing Tanks are too often neglected, and the only real safeguard in matters of this description is to have the tank automatic in its action. This is secured by Maguire and Son's patent, of which we append a sketch



and description. 1. Rain-water down-pipe, or bath waste-pipe. 2. Tank to collect waste water. 3. Valve to open when water overflows, and discharge water full bore into drain. 4. Balance Cistern, to receive overflow, and by the extra weight of overflow-water to open valve. 5. Driblet-hole in Balance Cistern, to empty same and close valve after flushing drain. 6. Escape-pipe for driblet-water. 7. Iron lever to open and close valve. 8. Overflow pipe from tank to cistern. 9. House-drain to be flushed. 10. Padlock and hasp, when cover is used, for artizans' dwellings and places where it is desired to prevent persons tampering with tank.

Next in order of this firm's exhibits we may mention Dr. SCOTT'S Hospital Disinfecting Apparatus, made for use either with gas or coal, which has been approved by the Local Government Board. Our illustration represents one intended for gas, and is constructed of an improved composite non-conducting material, with improved non-conducting door, hinges, improved fastener, perforated iron shelves, galvanised iron safety-carrying case, with two wicker linings for clothing; inspection valve, gas-heating apparatus, with four valves to regulate heat to desired temperature; improved automatic safety-valve, to prevent heat exceeding 300 deg.; improved pyrometer, indicating from 50 deg. to 400 deg. Fahr.; air inlet-valve; ventilating shaft with outlet-valve. The smaller sizes are suitable for laundries or institutions. The larger sizes are for hospitals and small unions. The same apparatus is supplied with



coal or coke furnace heating arrangement where gas is not available. The Improved Furnace is of wrought-iron, with sliding doors and valves. Improved arrangement for consuming all the air of chamber in furnace before doors are opened to remove clothing. A portable one is also manufactured by the firm, on the same principle, for removing from place to place. It is unnecessary for us to say more in connection with these apparatus, which have gained a wide celebrity. A variety of important sanitary appliances

of various kinds will help to make up a very extensive exhibit from this firm.

Messrs. FREDERICK WALTON & Co., Sunbury-on-Thames, and Berners Street, Oxford Street, will exhibit some choice selections of their popular wall decorations, better known as 'Lincrusta Walton', which may be also described as a new Linoleum product. The name 'Lincrusta' is taken from 'Linum', flax, the chief ingredient being solidified linseed oil, and 'Crusta' relief; and it was originally introduced with a view to improve the appearance of the interior of houses with decoration in relief, that by its moderate price should be within the reach of those to whom what may fairly be termed art decoration had hitherto been denied from its great cost. The object of the inventor in introducing this mural decoration was to produce by stamping the effect of carving, and to effect this it was necessary to have a material that, in its earlier stages, was soft and ductile, but that would afterwards become perfectly hard. Unless its use was to be confined to ceilings it must not be brittle. It must resist the effects of damp, and the alternations of heat and cold, and if it could be made a non-conductor on which the moisture of the air would not readily condense, so much the better. To be so workable that the artist could elaborate the designs by undercutting or otherwise, so tough, that the roughest scrubbing would not affect it, so durable that disease germs might be washed off it with dilute acid, an advantage would be gained hitherto unattained, and a material of the highest and most valuable artistic and hygienic uses would have been produced. Such an article is 'Lincrusta Walton'. It is adaptable to all kinds of interior decoration, is easily fixed, and the designs are of the most varied and *récherché* character, every style or ornamentation being capable of production.

THE PUBLIC HEALTH
DURING MAY 1881.

The mean temperature during May, at the Royal Observatory, Greenwich, was 54°.1, and 1°.5 above the average May temperature in 100 years. The mean temperature alternated frequently between excess and deficiency during the first three weeks of May, whereas a considerable excess prevailed on nine of the last ten days of the month. The mean showed an excess on 20 of the 31 days in the month, while a deficiency prevailed on the remaining 11. The coldest day was Tuesday, 3rd, when the mean was 43°.1 and 6°.0 below the average; the warmest day was Tuesday, 31st, when the mean was 62°.9 and showed an excess of 5°.6. Rain was measured at Greenwich on 13 of the 31 days in the month, to the aggregate amount of 1.6 inches, which was half an inch below the average May rainfall in 61 years. The rainfall in the first five months of this year amounted to 7.6 inches at the Greenwich Observatory, which was nearly an inch and a quarter below the average amount for that period. The sun was above the horizon during 482.1 hours in May, and 202.2 hours of bright sunshine were recorded at Greenwich, which exceeded the number of hours measured in any month since June 1877, and was 41.8 hours above the average amount recorded in the months of May of the four years 1877-80. North-easterly winds prevailed during the greater part of the month.

The Registrar-General has now adopted new estimates of the population of the twenty large English towns dealt with in his weekly return, based upon recently enumerated numbers; this new estimate makes the aggregate population of these towns 7,608,775, which is only 7642 less than the estimate previously in use, which was based upon the rate of increase that prevailed between 1861 and 1871. The rate of increase of population in the aggregate of these twenty towns was almost identically the same in the decade just completed as in the preceding ten years, namely 16.9 and 16.7 per cent. respectively. The rate of increase in the several towns, however, in the two decades, showed the widest variations, and, as a natural result, the estimates of population, based upon the known rate of increase between 1861 and 1871, in many instances differed very considerably from the more trustworthy estimates now adopted. In Leicester, for instance, the rate of increase, which was 40 per cent. between 1861 and 1871, declined to 29 per cent. in the following decade; in Nottingham, on the other hand, where it had been but 13 in the earlier, it increased to 34 in the later decade. In Salford the rate of increase in the two decades was respectively 22 and 41 per cent.; while in Bradford it declined from 37 to 24, and in Sheffield from 30 to 19. It was in these last five mentioned towns that the estimates of population, now discarded, showed the largest percentage of error, which exceeded 10 per cent. in Salford, Bradford, and Sheffield; the error was of over-estimate in each case, hence the recently published rate of mortality for each of these towns has been under-stated by at least a tenth. All the rates of mortality in the present article have been calculated upon the new and comparatively trustworthy estimates of population. The numbers enumerated in April last have not yet been finally revised at the Census Office, but it is improbable that this revision will seriously affect the value of these figures as a basis for mortality statistics.

In the twenty towns, during the four weeks ending 28th May, 20,685 births, and 11,819 deaths were registered. The births were equal to an annual rate of 35.5 per 1,000 of the estimated population, against 38.6, 37.5, and 35.3 in the three preceding months. The birth-rate last month did not exceed 33.9 in London, whereas it averaged 37.1 in the nineteen large provincial towns. It ranged upwards from 32.2 and 32.7 in Bristol and Brighton, to 40.9 and 42.6 in Sunderland and Salford.

The annual death-rate in the twenty towns during the four weeks of May averaged 20.3 per 1,000 of their estimated population, against rates ranging from 26.2 to 22.0 in the first four months of the year. The May death-rates in these towns in the three years, 1878, 1879, and 1880, were, respectively, 21.4, 22.4, and 20.7. The death-rate last month was therefore lower than in any recent corresponding period.

The lowest annual rate of mortality in the twenty towns last month was 15.1 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follow:—Plymouth, 16.6; Birmingham, 17.5; Bristol, 17.7; Norwich, 18.5; Hull, 18.9; Portsmouth, 18.9; Leicester, 19.0; Sunderland, 19.8; London, 19.9; Bradford, 20.1; Leeds, 20.8; Salford, 20.8; Nottingham, 21.4; Sheffield, 22.2; Newcastle-upon-Tyne, 22.2; Liverpool, 23.1; Oldham, 23.4; Manchester, 23.6; and the highest rate during the four weeks was 24.2 in Wolverhampton. In the nineteen provincial towns, which have an aggregate population very slightly less than that of London, the annual death-rate during May averaged 20.6 per 1000, while the rate in London did not exceed 19.9, although the zymotic fatality in the metropolis showed a considerable excess upon that which prevailed in the provincial towns. The excess of mortality in Liverpool, Oldham, Manchester, and Wolverhampton, was only to a slight extent due to zymotic fatality.

The 11,819 deaths from all causes in the twenty towns last month included 1,681, or more than 14

per cent., which were referred to the principal zymotic diseases. Of these, 432 resulted from measles, 328 from whooping-cough, 357 from small-pox, 236 from scarlet fever, 133 from fever (including typhus, enteric, and simple), 117 from diarrhœa, and 78 from diphtheria. These 1,681 deaths were equal to an annual rate of 2.9 per 1000 in the twenty towns during the four weeks under notice, and showed a further slight increase upon the rates from the same diseases prevailing in recent months. The zymotic death-rate last month was equal to 3.5 per 1000 in London, whereas it did not average more than 2.2 in the nineteen provincial towns; it ranged in these nineteen towns from 0.5 and 0.7 in Brighton and Norwich, to 3.1 in Liverpool, 3.3 in Sheffield and Bristol, and 3.5 in London. Fever, measles, and whooping-cough showed fatal prevalence in Liverpool, measles and whooping-cough in Sheffield, measles in Bristol, and small-pox and measles in London.

Measles was the most fatal disease in the twenty towns last month, causing 432 deaths, equal to an annual rate of 0.74 per 1000, against 0.27, 0.30, and 0.54 in the three preceding months. The rate from this disease was equal to 1.1 in London, 1.6 in Sheffield, and 1.8 in Bristol. Small-pox caused 357 more deaths in London, and one each in Brighton, Norwich, Liverpool, Salford, and Oldham; thus, only five deaths from this disease occurred during the month in the nineteen provincial towns. The prevalence and fatality of small-pox in London showed a further considerable increase during May upon that recorded in the four preceding months of the year. The number of small-pox patients under treatment in the Metropolitan Asylum Hospitals, which had steadily increased during the six preceding months from 105 to 942, had further increased to 1552 at the end of May, 538 of whom were accommodated at the Convalescent Camp Hospital at Darenth. The large increase of patients under treatment during May was in great measure due to the opening of this Camp Hospital, which enabled convalescents to be removed from the other Asylum Board Hospitals, and thus made room for the admission of new cases, that would otherwise have had to be refused for want of space. The average weekly number of new cases of small-pox admitted to these hospitals, which had steadily increased from 20 to 218 in the seven preceding months, averaged 262 during the four weeks of May. The largest proportional fatality of small-pox in the Metropolis again occurred in the South and East groups of registration districts. The 328 deaths from whooping-cough in the twenty towns were equal to an annual rate of 0.56, and scarcely differed from that which prevailed in the preceding month. Of this number, only 118 occurred in London, while 210 were recorded in the nineteen provincial towns, the largest fatality occurring in Leeds, Sheffield, Salford, and Manchester. The rate of mortality from scarlet fever corresponded with that in the preceding month, and was the same in the nineteen provincial towns as in London; it was proportionally highest in Wolverhampton, Hull, and Bradford. Fever, principally enteric, caused 133 deaths in the twenty towns during May, six less than in the corresponding period of April. The annual death-rate from this cause averaged 0.23 in the twenty towns, and again showed the greatest excess in Liverpool. The death-rate from diarrhœa was almost identically the same as was recorded in the three preceding months. The 117 deaths recorded from this disease included 50 in London and 67 in the nineteen towns. To diphtheria 78 deaths were referred, equal to an annual rate of 0.13 per 1000, showing a further increase upon the rates in March and April, which were 0.10 and 0.11 respectively. These 78 deaths included 45 in London, and but 33 in the nineteen towns, although 16 occurred in Portsmouth. Diphtheria has shown epidemic prevalence in Portsmouth for some months, and in the first five months of this year no less than 44 fatal cases were recorded within the borough.

The deaths of infants under one year of age in the twenty towns during May averaged 131 per 1000 of the births registered. In the two preceding months the proportion was 135 and 142, respectively. Infant mortality during last month did not exceed 125 per 1000 in London, whereas it averaged 137 in the nineteen other towns, among which it ranged upwards from 87 and 93 in Portsmouth and Brighton, to 158 in Sheffield, 175 in Leicester, and 181 in Bradford.

The fatality of diseases of the respiratory organs showed a further considerable decline during May. The average weekly number of deaths referred to these diseases in London, which had steadily declined from 513 to 355 in the first four months of the year did not exceed 262 during the four weeks of May, and was 22 below the corrected weekly number in the corresponding month of the last ten years. The annual death-rate from these diseases in London during May did not exceed 3.6 per 1000, against 7.2, 6.1, 5.2, and 5.0 in the four preceding months of the year. In Liverpool and Salford the death-rate from the same diseases last month was equal to 5.4 and 4.5 per 1000 respectively.

During the four weeks of May the causes of 242 deaths in the twenty towns were not certified either by a registered medical practitioner or by a coroner; these uncertified deaths were equal to 2.0 per cent. of the total deaths registered. The proportion of uncertified deaths did not exceed 1.2 per cent. in London, whereas it averaged 2.9 per cent. in the nineteen provincial towns. No uncertified cause of death was registered during May either in Portsmouth or Plymouth, whereas the proportion of such deaths was largest in Leeds, Norwich, Hull, and Sunderland.

In the outer ring of suburban districts around London, having a population now estimated at 958,966 persons, and nearly fifty thousand less than the estimate hitherto in use, the annual death-rate from all causes during May was equal to 14.6 per 1000, showing a considerable decline from the low rates prevailing in recent months. The annual death-rate from the principal zymotic diseases in suburban London was equal to 1.7 per 1000, showing a slight further increase upon the rates prevailing in the three preceding months; this was mainly due to the increased fatality of small-pox, to which 32 deaths in the outer ring were referred, against 12 and 22 in the two preceding months. The death-rate from all causes and from the principal zymotic diseases within registration London during last month was, as before stated 19.9 and 3.5 respectively. The low death-rate in suburban London is undoubtedly indicative of satisfactory health condition, but is probably partly due to the exceptional age distribution of the population, and also to the fact that a certain proportion of the deaths occurring amongst this population are recorded in hospitals and other public institutions situated within registration London.

SPECIAL REPORTS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on Friday, May 20th, Dr. BRISTOWE, President, in the chair. After the minutes had been read, the Council brought up a report on several subjects. First, on the joint deputation to the President of the Local Government Board, on notification of infectious diseases. As a report has already appeared in this journal (May 15, p. 428) on the subject, we need not recapitulate. As regards the provision of hospital accommodation for cases of infectious diseases, the Council did not think the present to be an opportune time for report, as enquiries are now going on by officers of the Local Government Board as regards the influence on the public health exercised by several of the Asylum Board's hospitals.

The Report on some questions submitted to the Society by Drs. Gladstone and Richardson, regarding the prevention of infectious diseases amongst children attending the Board schools was divided into two headings—(*a*) as to the course to be adopted for preventing children suffering from infectious diseases attending school during illness and until free from infection; (*b*) the necessity of preventing children attending school from infected houses, or who had been brought into contact with infected persons. As regards the first, the Council considered that no person not possessing medical knowledge can be trusted to recognise symptoms of infectious diseases in their early stage, and therefore, when ill, the child should be kept away from school. When absent from illness, a medical opinion should be obtained as to the nature of the illness and a certificate provided by the parents. If infectious disease be the cause of absence, the certificate should state that the clothes have been disinfected, and that the child is no longer infectious. No definite time can be stated during which a child should be absent, as the period for which infection lasts after an attack varies not only for each disease, but to a certain extent in each individual. They considered that every case of infectious disease should be reported to the Medical Officer of Health and investigated by a medical practitioner. As regards the second, the Council decided that, in their opinion, children should not attend school from an infected house unless there were a separate staircase besides the one leading to the room occupied by the infected patient. On the report being brought up, Dr. DUDFIELD pointed out the assistance which compulsory registration of infectious diseases would afford the School Board in preventing the spreading of those diseases in Board Schools.

The report on the removal of house refuse, etc., was received, and its consideration postponed, as being too important to be entered upon at that time of the evening.

Dr. RICHARDSON then read a paper on the Period of Incubation of Infectious Diseases. He began by stating, that although Dr. W. Squire had done a good deal towards ascertaining the periods of incubation in different diseases, yet more light is required, and careful observation of a number of isolated cases must be made. He mentioned the differences noted by various observers, and asked, are these differences real, or do they depend on carelessness, or on variations in the time occupied by the incubative stage, arising from variations in the intensity of the poison, or on constitutional peculiarities of the recipients? He would first enquire, To what period of the disease the term 'incubation' should be applied? This is not easy to settle, as some restrict the term to the time between the exposure to the disease poison and the first symptoms of illness, whilst others extend it up to the appearance of the rash. For instance, in inoculations for small-pox, an orange colour appeared round the prick on the fifth day, rigors and fever set in on the ninth day, and the rash appeared on the twelfth day. Which is to be taken as marking the termination of the incubative period? In scarlet fever, in the same way, is the depression of temperature and malaise, the fever or the rash, to be considered as indicating the termination of the incubative stage? To these questions, Dr. Richardson replies that he excludes the local manifestations, as they may appear before the constitutional symptoms; and the rash, as it sometimes does not appear at all; but he accepts sudden rigors and depression as the most certain signs of the invasion of the disease, and calculates the duration of incubation up to the date of their occurrence. It is true that in hydrophobia and syphilis there is probably no rigor. He divided all infectious diseases into five groups, according to their period of incubation. The first, quick, in which this period usually lasts from one to four days, such as cholera, malignant pustule, and septic poisoning from dissection wounds; second, short, in which it lasts from two to six days, such as farcy, scarlet fever, diphtheria, dengue, whooping-cough, and croup; third, medium, in which the incubation period lasts five to eight days, as in relapsing fever and varicella; fourth, long, ten to fifteen days, as small-pox, rotheln (German measles), typhus and typhoid; fifth, longest, viz., syphilis and hydrophobia. The first group is fairly steady as regards the incubative period, and he had some doubt if epidemic catarrh should not be included amongst infectious diseases. As to the second group, there are exceptions; for instance, scarlet fever sometimes has an incubative period of a few hours only, and he gave an instance of an attack from which he had suffered; and the third and fourth groups he also believed are fairly steady, although even amongst them there are occasional exceptions. He then proceeded to discuss the causes of the exceptions, pointing out, amongst other things, that the period of incubation is shorter after inoculation than after exposure to infection. He thought that in some cases of short period of incubation, there might have been some abrasion of the mucous membrane of the air passages. He also believed that there is increased susceptibility to infectious diseases, when great waste of tissue is going on. The length of convalescence is usually greater in those diseases which have a short period of incubation, such as scarlet fever, and that therefore greater care must be used in isolating these cases, than in those having long periods of incubation. He concluded by recommending the ordinary practical rules for preventing the spreading of these diseases to be enforced for checking their spread.

Dr. SQUIRE said that his experience proved that, ordinarily, the period of infectiousness, after the disease had concluded its acute stage, varied inversely according to the period of incubations; a short incubative period being followed by long convalescence. That he had never met with a case of measles in which the incubative period was less than seven or more than ten days; that of German measles being longer, and mumps usually as long as twenty-one

days. He believed that these diseases never originate, except from the bodies of the sick.

Dr. TRIPE said that he had treated several cases in which the incubative stage of scarlet fever was only eighteen hours; of small-pox as short as nine or ten days, and as long as fourteen or fifteen. He believed that small-pox is infectious before the rash appears, and that therefore persons who had been exposed to infection, should be isolated as soon as, if not before the constitutional symptoms appear.

Mr. MURPHY said that more facts are required on the subject, and especially that they should be collected by country members, as the sources of error are not so numerous in country places.

Mr. WYNTER BLYTH had met with two forms of rabies. He thought that short incubative periods were followed by severe forms of the disease.

Dr. DIXON objected to the term incubation, and preferred the preliminary period being calculated up to the appearance of the rash.

Dr. WILLOUGHBY mentioned a case of vaccination which did not develope vesicles for three months.

Dr. DUDFIELD considered that the many sources of infection in large cities rendered the data very often doubtful. He objected to varicella being used as a diminutive of small-pox, as they are different diseases.

Dr. BRISTOWE proposed a vote of thanks to Dr. Richardson, and thought that the incubative period included only the time which elapsed up to the appearance of symptoms, that the period subsequent to, and before the rash broke out, is that of invasion. He did not think that a rigor occurred in every case, and it could not therefore be taken as the symptom marking the end of incubation. As regards the incubative period, it is often longer in whooping-cough than that mentioned by Dr. Richardson, being about fourteen days. He had not found that of Rotheln to be so long, as in one marked case it was only five days. He objected to the use of diminutives.

Dr. RICHARDSON then replied and the meeting finished.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

ASTON MANOR.—Mr. May very properly gives in his report much fuller particulars as to the sanitary conditions prevailing and the sanitary work performed in his district, than health officers are accustomed to include in their annual reports. Thus, he speaks of the fluctuations in the building of new houses through the changing fortunes of the district, records the construction of a main outfall sewer for the place, condemns the locally favoured custom of building houses back to back, reports the gradual re-construction of the old-fashioned privy-middens on a better plan, and speaks well of the way in which night-soil is removed under the direct supervision of the Authority. Like most Officers of Health, Mr. May deplores the want of early knowledge of cases of infectious disease, and he urges the importance of providing a hospital within the district for the reception of such cases. Great attention was evidently paid to the removal of nuisances during the year, and the slaughter-houses, smoke-nuisances, and offensive trades were kept well under observation. During 1880 there were 914 deaths in the district, equal to a rate of 17.3 per 1,000. The mortality amongst children under five years of age was very high, amounting to 52.8 per cent. of the whole mortality. Mr. May observes in this connection that improper feeding, clothing, and nursing, not only caused many deaths by inducing marasmus, atrophy, or debility, but indirectly caused many more by rendering the infants an easy prey to acute diseases, such as bronchitis, summer diarrhœa, and brain disease. The deaths from zymotic diseases numbered 163, the largest proportion of which, 89, was due to diarrhœa.

BARNSLEY RURAL.—The death-rate of this district for 1880 showed an advance of more than fifty per cent. over that for 1879. The reasons for this excess are not stated with particular clearness in Dr. Sadler's report, but the mortality amongst young children was enormously high. The total number of deaths was 489, equal to a rate of 23.3 per 1,000. Of this number, 171, or nearly 35 per cent. were among children under one year of age, and 309, or no less than 63 per cent. under five years of age. These figures indicate a needlessly high mortality amongst children, and great ignorance or carelessness among parents as to the way in which children should be reared. Zymotic diseases caused 113 deaths, or 23 per cent. of the total. The most prevalent diseases were scarlatina, and diarrhœa, which was fatal in as many as 48 cases. Dr. Sadler adds to his annual account of works effected, an interesting summary of the sanitary progress made since his appointment in 1873, together with a sketch of the wants still existing, and of the work which still has to be done. Of the latter, the provision of a more abundant and better supply of water to certain of the townships seems to be the most urgent.

BIRMINGHAM.—In the fourth quarter of 1880, there were 3471 births and 1862 deaths in Birmingham, equal to rates of 35.2 and 18.87 per 1,000. The mortality was considerably lower than in the corresponding quarters of the two previous years, a result that is partly due to a large reduction in the mortality from zymotic diseases, and partly to a decline in the death-rate from local diseases generally, but more especially from diseases of the respiratory organs. Zymotic diseases caused 199 deaths, as compared with 368 in the same period of 1879. Diarrhœa was fatal in 85 cases, whooping-cough in 47, scarlatina in 25, fever in 21, and diphtheria in 15 cases. The increasing appreciation by the public of the benefits of the Fever Hospital is gratifying and encouraging. The usual particulars as to sanitary works effected during the quarter are appended to Dr. Hill's report.

CHESTER-LE-STREET RURAL.—Mr. Linton's report on the Chester-le-Street subdivision of this rural district is rather shorter than we should have wished. The facts given as to action taken are meagre, and generally the report would bear expansion. The number of births was 954, and of deaths 572, though the rates per 1,000 are not given. There was a considerable increase over the mortality of 1879, mainly attributable to the prevalence of diarrhœa, measles and scarlatina, chiefly among infants. The large number of fatal cases (93) attended by unqualified practitioners is noteworthy.

ERITH.—Mr. Jessett reports that very little change has taken place in the general condition of this district, though ordinary sanitary work seems to have been looked after. Active measures were taken for the abatement of the nuisances arising from the different factories along the river, with satisfactory results. The Local Board has, however, made no progress with Mr. Easton's 'very elaborate and thoroughly exhaustive' scheme for the sewerage of

the town, the plans of which still lie unheeded in the Board's office. Meanwhile, the houses continue of necessity to be drained into cesspools. The death-rate was satisfactorily low, 14.64 per 1,000, and though there was an extensive epidemic of measles, it was of a very mild type.

GLASGOW.—Dr. Russell's valuable quarterly reports do not profess to be more than statistical, but they are nevertheless of much general interest. During the third quarter of 1880, the general death-rate of the city was 22 per 1,000 living, the birth-rate 33 per 1,000 living. The deaths under five years amounted to 47 per cent. of the total deaths. The deaths under one year amounted to 50 per cent. of the deaths under five years, 24 per cent. of the total mortality and 15½ per cent. of the total births. Of the total deaths 82½ per cent. were certified, and 42½ per cent. were in Friendly Societies. Of the deaths under one year, in only 79½ per cent. was the cause of death certified; of the deaths one and under five years, in 90 per cent.; of the deaths above five years, in 95 per cent. Of the deaths under one year, 24 per cent. were in Friendly Societies; of the deaths one and under five years 50 per cent.; of the deaths above five years, 47 per cent. Of the children who died under one year, 16 per cent., and of those who died one and under five years, 8 per cent. were illegitimate. Consumption and acute diseases of the lungs caused 736 deaths, scarlet fever, measles, whooping-cough, croup, and diphtheria, 392, nervous diseases of children, 387, diarrhœal diseases, 268, fevers, 88, and small-pox two. As compared with the corresponding quarter of 1879, there was an increase of 498 deaths. This increase is shown in all the classified diseases, excepting those of the lungs, but chiefly in diarrhœal diseases, which were 198 per cent., or all but twice as fatal, and in the infectious diseases of children, which were 119 per cent. more fatal. As the diarrhœal deaths fall almost wholly upon the years of childhood, the vital conditions of the quarter were peculiarly inimical to children. The concurrence of epidemic scarlet fever with heat and drought, which result in infantile diarrhœa, were the factors in the higher mortality of the quarter.

GREENOCK.—Dr. Wallace's customary monthly reports, give much valuable information as to the vital statistics of Greenock, which, it will be remembered, is one of the places where all cases of infectious disease are compulsorily reported to the Sanitary Authority. In the last three months of 1880, the death-rates were 22.8, 28.6, and 22.5 per 1000 respectively. The mortality of young children was on each occasion excessive, constituting in the several months, 48.6, 53.1, and 54.4 per cent. of the total mortality. Diseases of the respiratory organs were sustainedly fatal, causing in each month 32.8, 32.2, and 23.9 per cent. of the deaths. From zymotic diseases occurred in all 85 deaths, of which one was from small-pox, four from typhus, two from typhoid, two from an undefined fever, eight from scarlatina, 19 from measles, 25 from whooping-cough, 13 from croup, one from diphtheria, and six from diarrhœa. During the quarter, 1,009 cases of infectious diseases became known to the department, by far too few, however, being reported by the householders themselves, in accordance with the Local Act. The greater proportion of the cases seem to be found out by the Sanitary Inspectors in the course of their daily rounds, but it is manifest that under this system a number of cases, and those the most important, may not be heard of. Some prosecutions recently taken against householders appear to have effected an improvement in this respect. The prevailing epidemic of the quarter was measles, of which no less than 687 cases were reported.

HARTISMERE RURAL.—Dr. Barnes sends as usual a careful and complete report for 1880, with a number of useful tables of mortality. The sanitary condition of the district is reported as in many respects more satisfactory than in 1879, and the mortality was much less than in that year. The birth-rate was 32.5, against an average of 31.2 per 1,000, and the death-rate 16.8, against an average of 18.0. The deaths of infants amounted to a little over 20 per cent. of the total mortality. Scarlatina hung about the district all the year, and invaded thirty-seven houses in ten parishes, attacking, so far as known, 103 persons. It seems to have been largely spread by the ignorance and carelessness of the population with regard to infection. Six cases of typhoid were reported, and a somewhat wide-spread epidemic of measles occurred. A number of samples of drinking-water were analysed, and nuisance repression satisfactorily looked after.

HASTINGS.—Though no works of importance were carried out in Hastings during 1880, a goodly number of nuisances were repressed, and house-drains improved. Mr. Ashenden recommends, indeed, the provision of a better infectious hospital than at present exists, and it would be advantageous if the Rural and Urban Authorities were to join together for this purpose. The birth and death-rates were 27.15 and 18.16 per 1,000, against corresponding rates of 26.97 and 16.84 in 1879. The infant mortality is still very high, those dying under five years of age numbering more than a third of the total. The deaths from zymotic diseases were considerably above the average, no less than 50 deaths occurring from diarrhœa in the two summer quarters alone. The only causes that Mr. Ashenden can ascribe for this mortality are teething, want of breast-milk, and injudicious feeding. Amongst other diseases, scarlet fever caused eight, typhoid five, and measles seven deaths.

HELMSLEY RURAL.—Dr. Bruce Low's reports are always interesting, and that for 1880 is no exception to the rule. Last year, there was an unusual prevalence of infectious diseases in the district, measles, scarlatina and whooping-cough being introduced from without, while enteric fever and diarrhœa apparently developed themselves from within. There were outbreaks of enteric fever and diarrhœa at Helmsley, evidently due to the inefficient drainage of certain portions of the town, and to the want of systematic removal of excrement and garbage. The amount of sickness and mortality was greater than usual. The total number of deaths was 84, and, after deduction of the persons dying in the district but not belonging to it, the death-rate was 19.1 per 1,000. Notwithstanding the continued rains, and the comparatively low temperature, the deaths from respiratory diseases were fewer than usual. In speaking of the mortality among infants, which he regards as largely due to improper feeding, Dr. Low argues earnestly in favour of the extension of the Infant Life Protection Act, and gives a striking illustration of the evils which the present Act is powerless to stop.

HITCHIN.—The Local Authority of this place seem to be earnestly at work, for they provided a constant supply of water during the year 1880, and materially improved the drainage. But they have still much before them, and Mr. Jenner especially urges the need of a hospital for the isolation of in-

fectious cases. Scarlatina is at present very prevalent in the town, and he can make no headway against it in the absence of isolation. The general death-rate last year was 17 per 1,000, the lowest the Health Officer has hitherto had to record. The mortality amongst children under one year of age is, however, much too high, and Mr. Jenner thinks something else must be done to improve the general moral tone of the community, besides giving them more wholesome dwellings to live in.

ILFRACOMBE.—Dr. Slade King has a very satisfactory death-rate to record for 1880, the mortality being 13.8 per 1,000. Out of the 77 deaths, six were due to diarrhœa, and one to scarlet fever. At the time of the diarrhœa prevalence, there was a high temperature, and east wind prevailed. The Authority have decided against the erection of a public slaughter-house, but have called on owners of all the private slaughter-houses to put them in repair. An important section of the public sewers is now being re-constructed, at an expense of nearly £1800, and a large scheme for the improvements of the water-works is on hand. Increased attention is being given to the early and complete removal of all house refuse, and generally this popular watering-place seems to be well looked after.

KENSINGTON.—Dr. Dudfield, to whose courtesy we are indebted for copies of his monthly reports of last year, has now re-published these reports as a single volume, adding a summary for 1880, and special reports on the slaughter-houses and cowsheds of the parish, and on the compulsory notification of infectious cases. We have before had occasion to speak in eulogistic terms of Dr. Dudfield's work, and of his reporting, and it only remains therefore to state, that the volume now before us is in no sense unworthy of those that have preceded it. During last year, there were 4,605 births and 2,884 deaths in the parish, equal to rates of 29 and 18 per 1,000. The deaths under five numbered 1211, and were equal to 42 per cent. of the total deaths. Under one year, there were 718 deaths, equal to 24.9 per cent. of the total deaths. The mortality from zymotic diseases was larger than usual, the actual number of deaths being 467, equal to a rate of 2.9 per 1,000. Scarlatina was the most serious epidemic of the year, 466 cases having been recorded. Of the 105 deaths from this disease, 22 occurred at the Fulham Hospital, to which some 150 cases were removed. Of small-pox there were fifty cases recorded. Diseases of the respiratory organs were fatal in 880 cases, or about 200 less than in 1879. The number of uncertified deaths was 27, or less than one per cent. of the total deaths. The majority of these were infants whose deaths were registered on the information of midwives.

LANCASTER.—Dr. Harker does not give the true death-rate for this town in his report for 1880, but calculates the rate from figures, including a number of deaths at the infirmary and the workhouse, which apparently ought to be excluded from the calculation. The recorded death-rate of 22.2 per 1,000 must accordingly be read with some allowance for deaths not belonging to the district. Compulsory notification of infectious diseases, and a new fever hospital have been established in the town, and to each of these Dr. Harker refers in terms of approval. He does not give the number of deaths from specified causes, but says that diarrhœa of a fatal character prevailed during the third quarter of the year, and that ague made its re-appearance after many years' absence. The Health Officer draws attention to the necessity of filtering the town's water, and of better regulation of the products of manufactories. Ordinary sanitary work seems to have been well attended to.

LONGTON RURAL.—In this district, the death-rate for 1880 was, according to Mr. Walker, higher by 1.2 per 1,000 than in 1879. Twenty-one of the 153 deaths occurred in children under one year of age, and 68 in persons above the age of 60. Twenty-two deaths were registered from all ages without any actual disease. Zymotic diseases caused six deaths, three of which were from typhoid, and two from scarlet fever. Four outbreaks of the latter disease were reported, and five of typhoid, which was usually associated with the drinking of polluted water. Mr. Walker, speaking of the danger of polluted water, says that without chemical analysis it is impossible to detect the presence of the poison. He might have added that it is equally impossible to detect it even with chemical analysis.

LYTHAM.—Dr. Pountney's report calls for no particular comment. He records a smaller amount of sickness than the average in the first, second, and also in the fourth quarter of the year, whilst in the third there was an increased amount, due principally to diseases of the respiratory organs and diarrhœa, which chiefly affected old people and young children. At no time were there many cases of zymotic diseases under treatment, and with the exception of a few cases of whooping-cough and chicken-pox, the district has remained entirely free from infectious disease for many months past. The birth-rate was 24.6, and the death-rate 16.6 per 1,000. A sanatorium for the district is still unbuilt, but the drainage has been improved and several new ventilators provided.

MEXBOROUGH.—Dr. Sykes, in presenting his annual statement for 1880, expresses his regret that he is unable to give so satisfactory a report as usual. The death-rate was unusually high (20.31 per 1000), and there was at least one very serious outbreak of enteric fever. No less than 83 out of the 128 deaths occurred in children under five years of age, while 51, or nearly two-fifths, occurred in infants under one year. This large proportion of infantile deaths is in a measure accounted for by the high birth-rate; but it must still be regarded as very much too great. Scarlatina caused the same number of deaths as in 1879 (7), but there was a marked decline of fatal whooping-cough. Four deaths occurred from typhoid fever, a considerable outbreak occurring in June from the pollution of the water-supply and the filthy state of the privies in the locality of its occurence. In a group of 30 cottages there were no less than 45 cases, 2 of which were fatal. Dr. Sykes observes that 'in too many instances at Mexborough, as elsewhere, the builders of houses have proceeded on the principle of digging two holes in the back yard, within a few feet of each other, one of which they call a well, and drink out of, the other they use as a receptacle for fæcal and liquid matter, and call it a privy, never considering that the liquid contents of the latter drain into the former, and change what should be pure water into a nauseous poison'. As to the general sanitary state of the town, Dr. Sykes believes the drainage generally to be good; but the nuisance inspection would seem, from the facts given incidentally in the report, to be susceptible of very great improvement.

MILTON RURAL.—In 1880, scarlatina appeared in almost every parish of this district, though fortunately the disease was of a mild character, only two deaths being registered from it. A hospital for infectious diseases which is building for the district

will doubtless enable Mr. Sutton to check the spread of this disease, as well as others, more effectually than before. Measles was also very general, 'invading whole parishes at one time'. The water-supply of the district is in course of improvement, and generally the district seems to be well looked after. The death-rate is given as 15.3 per 1000 of the estimated population.

MONMOUTH RURAL DISTRICT.—Dr. Willis seems a little too prone to connect things together as cause and effect, but otherwise his report is a fairly representative one. He has to record for 1880 the extremely low death-rate of 12.65 per 1000, which, for a district so circumstanced, is not easily to be accounted for. There seems no lack of unwholesome conditions in the district, the water-supply especially being often open to suspicion. Scarlatina repeatedly manifested itself in different and distant parts of the district; several cases of typhoid occurred at various times; and whooping-cough became epidemic in January. Notwithstanding this and the depression of trade, the death-rate was much lower than even the healthiest of the standard rural districts.

NEWBIGGIN-BY-THE-SEA.—There is but little to note in Dr. Reid's report for 1880. The annual death-rate of the place was 18.96 per 1000, the deaths numbering 28, against 29 in 1879. Several cases of scarlatina occurred, and measles and rubeola were both prevalent. The sanitary state of the district was well looked after, but there is still much work before the Local Authority.

NORTH WITCHFORD RURAL.—Mr. Stephens' report perhaps is a little prolix for the Local Authority; but this is a good fault, and the report contrasts very favourably with the bald statistics which Medical Officers of Health are too often content to present as their annual reports. All the deaths in the district from causes at all preventable seem to have received Mr. Stephens' careful attention, and he discusses, in addition, the mortality at each of the various stages of life. He adverts to the diminishing birth-rate in the Union, which he attributes mainly to the exodus of young married couples or of marriageable persons, and to delayed marriages, through the depressed condition of agricultural industry. The birth-rate was only 26.6, against one of 33.9 in 1877. The death-rate was satisfactorily low (14.27 per 1000), and the mortality from zymotic diseases was small. The Medical Officer of Health seems from his report to be working with conspicuous energy.

PETERBOROUGH URBAN AND RURAL.—For the city of Peterborough Dr. Thomson has to record an improved death-rate in the year 1880, due probably to the extensive sanitary improvements which are taking place. A number of cases of typhoid fever were reported, mostly in association with defects of water-supply. Of 47 samples of water analysed by Dr. Thomson, 24 were found wholesome, and 23 so impure as to be unfit for drinking. The recommendation that where house drainage has been carried out, a plan of such drainage should be kept, is an eminently wise one, since much time and money are often wasted through the exact position of an offending pipe not being known. In the rural district there was also an improvement in the death-rate, though there was a good deal of scarlet fever about. A somewhat considerable outbreak of typhoid fever occurred at Farcet in the latter part of the year, due apparently to infected privies and polluted water-supply. Dr. Thomson draws attention to the question of preventing excrement nuisances in villages and rural districts where there is no regular system, and recommends dry earth or ash closets.

SITTINGBOURNE.—The most remarkable feature in the death statistics of this place for 1880 was the prolonged prevalence of scarlatina, which, though it invaded 140 houses, only caused three deaths. Measles was also very prevalent, but was fatal in one instance only. Enteric fever caused four deaths in distinct parts of the district. If it be correct that no less than 51 of the total of 147 deaths were those of children under one year, the ignorance of mothers in the rearing of their infants must indeed be desperate. The experience of the scarlatina epidemic makes Mr. Sutton still more confident of the necessity of compulsory notification of infectious disease, so as to secure the isolation of the very first case.

THINGOE RURAL.—The death-rate for this district during 1880 was 15.2 per 1000, against a rate of 16.5 in 1879. Twenty-one per cent. of the deaths were of children under one year of age, 40 of persons between one and sixty years, and 39 per cent of persons over the latter age. With the exception of diarrhœa, zymotic diseases were not particularly prevalent. Scarlatina existed, however, in several villages, and there was more than one outbreak of diphtheria. One case was remarkable through the pre-existing prevalence at the house of a malady closely resembling diphtheria amongst the several hundred fowls kept on the farm. The water-supply was kept under observation by Dr. Kilner, and many privies were erected or repaired. A large number of houses were visited for the detection of overcrowding, and 16 of the worst cases were remedied.

TORQUAY.—Mr. Karkeek experienced some disappointments last year in his work as Medical Officer of Health. The sanatorium that was about to be built from the designs of Mr. Ernest Turner was delayed because of the opposition of certain misguided individuals, and had it not been for the generosity of a resident in giving another site, the question would have been permanently shelved. Another matter that has not proved so successful as Mr. Karkeek wished was the attempt at sewer flushing, which he desires to see automatic, or nearly so. Some progress was made in the matter of sewer ventilation, but there still remains much to be done. On the other hand, the works necessary for the continuous system of water-supply have made considerable advance. During the year certificates were given for 101 new houses as being fit for habitation; and systematic inspections of the district were from time to time performed. The number of deaths in the town was 430, equal to a mortality of 15.9 per 1000 of the estimated population; an increase on the previous three years. The increase was partly due to the mortality from measles, which caused as many as 26 deaths, to whooping-cough, from which 18 deaths occurred, and to summer diarrhœa, which caused 16 deaths.

WAREHAM AND PURBECK RURAL DISTRICT.—After recording the results of his systematic inspection of the district, and stating the advice given by him in particular cases, Dr. Stainthorpe proceeds to comment upon the difficulties of Health Officers in their attempts to prevent the spread of infectious disease; and he recommends the compulsory notification of such cases, the isolation of the patient, the provision of a portable stove for disinfecting bedding, etc., and the judicious distribution of pamphlets (like those of the National Health Society) giving popular advice as to sanitary matters. The death-rate of the district was 14.2 per 1000, the actual

number of deaths being 344. Epidemics of measles, scarlet fever, and whooping-cough passed over the greater part of the district during the year. In speaking of the defective provision in the majority of labourers' cottages for carrying off rainfall and ground water, Dr. Stainthorpe refers to the excessive prevalence of phthisis, which he thinks is induced by excessive moisture.

LAW REPORTS.

NEGLECT OF SEWERS.

Fleming v. *The Corporation of the City of Manchester.*

This was an action brought by the owner of some house property in Manchester to recover damages for the destruction of his premises by the bursting of a drain during a violent storm of wind, rain, and lightning. The case was tried before Mr. Justice Stephen at Manchester, when the jury found that the destruction of the house was caused by the bursting of the sewer, which had resulted from defects in its original construction, by the omission of the defendants to take reasonable means of keeping it in a proper condition, and not by lightning, as alleged by the defendants. Upon those findings the parties moved for judgment, and his lordship now gave his decision.

Mr. Justice Stephen was of opinion that, on the authorities in the case, the Corporation were under legal duty to use such powers as the statute gave them to keep the sewers in proper order, and from time to time to inform themselves of their condition; that the 14 and 15 Vict., c. 19, and 11 George III, c. 49, gave the Corporation power to cause the sewer to be cleansed and repaired, and that common law super-induced upon that power a duty to use it, and to use all reasonable means of informing themselves whether there was occasion to do so; and that the finding of the jury showed that they omitted to perform that duty, and so were negligent. He would, therefore, give judgment for the plaintiff for such an amount of damages as would be agreed upon between the parties, but would stay execution until June 5th, to allow the defendants an opportunity for moving for a new trial. Judgment was given accordingly.

POLLUTION OF RIVERS.

The Attorney-General v. *Birmingham, Tame, and Rea District Drainage Board.*

On the 16th of April, 1875, a perpetual injunction was granted to restrain the Council of the Borough of Birmingham from polluting the river Tame where it ran through the estate of Baron Norton, then Charles Bowyer Adderley, by sewage. The present defendants had, under the Public Health Act, 1875, purchased the outfall works from the council of the borough and were carrying on the works; and the plaintiff instituted the present action to make the decree of 1875 available against them. The defendants demurred on the ground that there was no ground of complaint against them, that their drainage works were not alleged to cause any damage to the plaintiff's property.

Vice-Chancellor Bacon said the demurrer could not be sustained. The town council had transferred their rights to the present plaintiff, and the statement of claim in this action stated that since such transfer the sewage of the borough of Birmingham had been drained into the river Tame, and the demurrer, would, therefore, be disallowed. The defendants were allowed a month to put in their defence.

THE SMOKE NUISANCE ACT.

Mr. John Clark, of 1A, Brewery Road, Caledonian Road, has been summoned by the Commissioners of Police for unlawfully using a furnace that was not so constructed as to consume its own smoke. Mr. Hosack ordered the defendant to pay a fine of forty shillings, and £1 13s. 6d. costs.

CROWN PRIVILEGES AND PREROGATIVES.

At the Chatham Police court the stipendiary magistrate, Mr. E. J. Athawes has given a decision in a case as to the closing of a public path on the Lines, Brompton, in which the Secretary of State for War had been summoned by the Gillingham Local Board for obstruction. On consideration of the case, the magistrate said: I am of opinion that there is a highway proved to exist by evidence of long usage, and that the act of obstruction is proved to be that of the Secretary of State for War, and that it is *ultra vires* illegal and wilful, and that he is amenable to this process, unless he is protected by some special provisions of an Act of Parliament. I have examined in particular the 34th and 37th secs. of 5 and 6 Vic., cap. 117, which, while they make the Secretary of State to sue (without saying, 'And be sued') preserve without curtailment the privileges and prerogatives of the Crown, and make him in person and property not liable to legal process or execution. These provisions appear to me to afford him such special statutory protection, and on this ground only, subject to any directions that I may receive from a superior court, I hold him to be not amenable on this information, which I accordingly dismiss. The solicitor to the Gillingham Local Board, applied for a case, which the magistrate granted.

BRIEF NOTES OF USEFUL CASES.

HIGHWAYS.

1879. *Worthing L. B.* v. *Lancing Surveyor.* "Highway Act, 1835," s. 94-5—Part of road entirely washed away by sea—*Mandamus* to Justices to hear the case or direct an Indictment refused, the facts showing that the road at the *locus in quo* had absolutely ceased to exist, and therefore the sections of Statute cited not applicable. (*Times*, Dec. 9, 1879.)

ARBITRATION.

1879. *Warburton* v. *Haslingden L. B.* "Public Health Act, 1875," s. 180—The reference to arbitration of a dispute as to compensation is a submission to arbitration by consent within the "Common Law Procedure Act, 1854," and the court may (under s. 8) remit the award back to arbitrator for consideration; but proposed remittance refused under the circumstances. *Kellett* v. *Tranmere* dissented from. (48 L.J., C.P., 451.)

HOSPITAL.

1879. *Portman (Visct.)* v. *Home Hospitals Association.* Covenant in lease not to use premises for "carrying on any art, trade, or business, occupation or calling," held to prohibit user of house for hospital purposes, even although without a view to profit to the managers. (W.N., 1879, p. 196.)

ORNAMENTAL GROUND.

1880. *Jacobson* v. *St. Pancras Vestry.*—Disused Burial Ground proposed to be laid out as an orna-

mental garden—Orders in Council under 20 & 21 Vict., c. 81, s. 20, for the improvement of disused Burial Grounds, do not apply to private Burial Grounds. (44 J.P., 184.)

LANDS, PURCHASE OF.

1879. *Eccleshill, L.B., In Re.* Land purchased for sewage farm—Price settled by Jury—Uncertainty as to date of entry into possession—Held that under the circumstances interest was payable from date of Jury's verdict. (49 L.J., Ch. 214; L.R., 13 Ch.D., 365.)

ARTIZANS' DWELLINGS.

1880. *Carr* v. *Metrop. B.W.* "Artizans' Dwellings Act, 1875," sched. sub.-s. 8, 11, 12—Compensation to owner—Omission of owner's interest from provisional award—Powers of arbitrator to award compensation. (49 L.J., Ch., 272; L.R., 14 Ch.D., 807; 42 L.T., 354.)

HIGHWAYS IN URBAN DISTRICTS.

1879. *Swansea Improvement Co.* v. *Glamorganshire County Roads Board.* "South Wales Turnpike Act, 1844," 7 & 8 Vict., c. 91; "Public Health Act, 1848"—A road not repairable by inhabitants at large, held not vested in the Urban but in the County Authority. *Nutter* v. *Accrington* distinguished. (41 L.T., 583; 43 J.P., 798.)

WATER, POLLUTION OF.

1880. *Smith* v. *Denny Police Commissioners.* Right of Local Authority to repair a public well situated on private ground, and to erect a pump, held established. (W.N., 1880, p. 41.)

MARKET.

1879. *London, Mayor* v. *Low.* Ancient Market—New Market—Disturbance—Smithfield Market removed under Parliamentary authority, but all privileges preserved—Held on the facts proved that the defendant's system of sales was an infringement of the plaintiff's rights. (49 L.J., Q.B.D. 144; 42 L.T., 16; 44 J.P., 169.)

APPOINTMENT.

1880. *Marr* v. *Greenwich B. W.* "Metropolis Management Act, 1855," s. 227—Summonses for expenses of sewer—Notice of apportionment served in 1876—First demand for payment in December 1878—Held that the six months' limitation ran from December 1878, and therefore summons was served in time. (44 J.P., 424.)

RATES. LEGAL PROCEEDINGS.

1880. *Regent's Canal Proprietors* v. *Archer.* Occupation of land—Demise to tenants—Rate made on landlords—On non-payment, distress—Replevin—Rate held bad, and that action of Replevin would lie. (W.N., 1880, p. 42.)

HIGHWAYS.

1879. *Aveland (Lord)* v. *Lucas.* "Highway Act, 1878," s. 23—Damage to road by traction engine drawing heavy materials—Engine within the statutory weight, and the materials ordinary materials—Held, nevertheless, that the owner was liable—What is "excessive weight" and extraordinary traffic must be determined in each case, with reference to the ordinary traffic of the road affected. (49 L.J., C.P. 643; L.R. 5, C.P.D. 351; 42 L.T., 788; 44 J.P. 360.)

LANDLORD AND TENANT.

1879. *Hartley* v. *Hudson.* "Public Health Act, 1848," s. 69—Covenant to pay rates, taxes, and charges—Plaintiff lessor of premises—Notice to him to pave, &c—On default, work done by Local Board and recovered from plaintiff—Held that the outlay was one which the landlord was entitled to recover from his tenant under covenants in the lease. (48 L.J., C.P., 751; L.R. 4 C.P.D. 367; 43 J.P., 784.)

PAVING EXPENSES.

1880. *Tottenham L.B.H.* v. *Rowell.* Rate for works of sewering—Delay of several years in enforcing payment—Action to make the amount a charge on the property under the "Public Health Act, 1875"—Held that this power was independent of the summary remedy, and that the statutory limitation of 6 months for summary proceedings did not apply to this remedy. (50 L.J., Ch. 99; L.R. 15 Ch., 378; 43 L.T., 616.)

CLERK OF LOCAL BOARD.

1879. *Meredith* v. *Radcliffe L.B.* Law stationers employed by Local Board Clerk to do certain work which, as Clerk, it was his duty to do himself—Plaintiffs held not entitled to recover from the Board, there being no proof of agency. (43 J.P., 819.)

LEGAL NOTES AND QUERIES.

FEES TO MEDICAL OFFICERS AS WITNESSES.

On March 5th last, at the request of the Inspector of Nuisances, I made a journey of sixteen miles to examine the carcase of a sheep supposed to be 'unfit for human food', the consequence being that the carcase was 'seized'. On March 6th I travelled eight miles to 'certify for the guidance of a justice', in order to get the meat 'condemned'. On March 8th I 'advised' the Local Authority on the subject, and consequently legal proceedings were instituted. On March 14th the case was heard at a Court of Petty Sessions, and the defendant fined £5 and costs. The costs included £1 2s. 2d., as a fee and travelling expenses for me. At a meeting of the Sanitary Authority held after the case had been decided, and the costs paid by the defendant, a member of the Board questioned my right to receive a 'fee'. I contend that as Medical Officer of Health at an annual salary I complied with Rule 4 of the Order of the Local Government Board, dated Nov. 11th, 1872, inasmuch as I 'certified for the guidance of a justice', and 'advised the Sanitary Authority', but that being required to attend in court I was rendering service for which I was entitled to additional remuneration. Would you, Mr. Editor, be good enough to express your opinion on the matter? and say if I am entitled to the fee, and also whether the Sanitary Authority can object to me receiving the remuneration granted by the magistrates? M. O. H.

[Surely our Correspondent's Board are not going to be so mean as to try and deprive him of a fee actually authorised to be paid to *him* by a *Court of Law.* There can be no pretence for this. It would be very different were he to claim *from his employers* a special fee for giving evidence: to that we think he would not be necessarily entitled.—ED.]

NUISANCE FROM PIG-KEEPING.

May I ask for your legal opinion upon the following case? Our Local Authority here have a bye-law prohibiting the keeping of pigs within 75 feet of a dwelling-house; but there are several people in the district who keep pigs within the proscribed distance. I, as Sanitary Inspector, am, however, unable to certify that these pigs are so kept as to be a nuisance, or injurious to health (Section 91, Public Health Act); and the Local Authority consequently feel themselves unable to take any steps to have the pigs removed, although their bye-law is infringed. Must pigs be kept in

such a way as to be a nuisance, before the Local Authority can enforce their bye-law?

SANITARY INSPECTOR.

[The object of such a bye-law as that now in question is to supplement the provisions of the Public Health Act, 1875, by requiring that pigs shall be kept in such a manner as to avoid the probability of their causing injury to the health of the occupants of any neighbouring dwelling-house. As 75 feet has been fixed by the local bye-laws as the distance from a dwelling-house within which the keeping of pigs is with this view prohibited, it is evident that a breach of the bye-law may be committed, although the offence may not occasion an actual nuisance such as would come within the terms of Section 91 of the Public Health Act. The Local Board would, therefore, be in a position to institute proceedings for recovery of penalties for breaches of the bye-law before any nuisance had in fact arisen. Under Section 91 the Local Board are only empowered to institute summary proceedings against persons keeping animals so as to be a nuisance, or injurious to health; but the power conferred by the bye-law relates to the prevention of the keeping of animals on any premises so as to be injurious to health.—ED.]

REVIEWS.

The Plumber and Sanitary Houses: a practical treatise on the principles of internal plumbing work, or the best means for effectually excluding noxious gases from our houses. BY T. STEVENS HELLYER. Second Edition. London: B. T. Batsford, 52, High Holborn.

MR. Hellyer's book deserves very considerable praise from whatever point of view it is regarded. The author understands his business, and he understands how to describe apparatus clearly and how to explain the action of the various contrivances employed by the sanitary engineer. He has prepared an excellent series of illustrations, clearly drawn and well engraved. He is not led away by any fanciful theories, but bases his recommendation on well-established principles. In fact, the book is so good, that one cannot but wish that Mr. Hellyer had kept his own designs a little more in the back-ground, since the book might then have been used as a text-book for students of sanitary science. As the book stands, it can hardly be so used; the student would be left with an impression that it was his duty to use Mr. Hellyer's patented designs very largely. Now Mr. Hellyer's designs are good. The ignorant builder or householder will be very safe if he puts himself into Mr. Hellyer's hands, but it is also certainly possible to fit up a house with good plumbing work without adopting even a single one of Mr. Hellyer's patents. Some improvement might be effected in certain points of detail in a future edition. In the paragraph treating of siphoning action, chapter one, the mode of fixing the ventilating pipe which prevents this action might be more fully and clearly explained. Where the soil-pipe trap is just described a warning should be given that no trap is wanted or desirable, unless the drain here leaves the house. It would be a grave mistake to place a soil-pipe trap at the junction between the vertical soil-pipe and a horizontal drain passing under the house. Of course Mr. Hellyer might answer that no drain ever should pass under a house; but drains often do, and in some cases must, so pass, and advice should be given to meet those cases. Mr. Hellyer condemns iron wholly as a material for drain-pipes, but this subject is treated neither fully nor impartially. On one point Mr. Hellyer gives advice which must be intensely regretted. After describing very justly the merits of the valve closet, he goes on to say, under the protection of an *if*, 'it might be fixed, as has been done in a bed-room, without the slightest risk to one's health, though it is always advisable to partition it off from the sleeping apartment'. Architects and owners of houses may decline to have closets placed in this way, but there should be no tampering with the undeniable truth that closets cannot be fixed in this way without real danger. *If* joints are well made; *if* the trap is filled with water; *if* the ventilating pipes do not choke; *if* no infectious disease germs are present in the drain, there will be no danger from the closet, and Mr. Hellyer's whole work is a lesson showing that the best contrivances, from careless use, neglect, and natural decay, are liable to be out of order. Then the sewer gas possibly laden with germs is admitted into the most dangerous place of all, the sleeping-room. To put a water-closet in a bed-room is like storing poison in one's larder, or dynamite in a smoking-room, trusting to cunning devices to avert danger. Nor is the case at all improved by a *partition* between the closet and the bed-room; the air is necessarily drawn in from the little closet with no chimney into the warm bed-room with a chimney. Indeed, if the closet has an open window, the greater part of the supply of air will be drawn through the closet. The partition exists merely for the eye, and in no way excludes the sewer gas. This special danger exists most often in the house of the richer classes, and perhaps goes far to explain the frequent cases of typhoid among the aristocracy. The writer would rather sit up all night than sleep in a bed-room with a water-closet in it, or simply partitioned off it, and cannot think without dismay of closets so placed, and perhaps designed, in accordance with a new heresy, without a trap, but communicating with a long length of soil-pipe open at the bottom, so that when all windows are shut, the bed-room draws its main-supply of air through yards of slimy pipe. Mr. Hellyer is quite sound on this point of trapless closets; he says 'he would not allow water-closets, or any sanitary fitting, to be fixed without traps on a long length of soil-pipe or waste-pipe, even though such pipes were trapped at the foot, or discharged with an open end, for it is *impossible* to pass large bodies of foul matter through such pipes without fouling them'. This is a plain matter of common sense. Some of our sanitarians are such admirers of ventilation or aëration, that they seem to think that when they have provided for currents of air and water through a soil-pipe, they have rendered it as clean and harmless as a well-washed tile, that any air which has come through so well-ventilated a pipe must be harmless. The writer wonders whether they would let sewerage matter run down an open channel through their bed-rooms and never even scrub the inside of the channel. Yet this would not be so bad as letting the bed-room suck air up their ventilated soil-pipes. These trapless closets, wherever they are placed, supply some air to the house which has passed up slimy pipes. No flushing will keep the inside of soil-pipes in the condition of a well-washed dinner-plate, and in most cases the rush of water from the closet becomes a mere trickle a few yards down the pipe. Traps, like watches, occasionally go wrong, but that is no reason for abandoning their use. The sure lesson is that we must

choose a good article, and have it examined and cleaned from time to time. Mr. Hellyer's remarks on traps are on the whole excellent. Some experiments on cowls are given. Mr. Hellyer decides on the whole in favour of Mr. Buchan's design.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

SANITARY ASSURANCE.

Most sincerely do I wish that I could view with greater favour the new development of what is somewhat vaguely known as 'the co-operative system', recently introduced to notice in the shape of the so-called Sanitary Associations. *Rem—quocunque modo rem* is a maxim to which, though not quite of universal application, I should certainly be disposed in sanitary matters to accord the widest possible operation. Let the Augean atmosphere of an ordinary London dwelling-house be but fairly purified, and I should care little to enquire too closely into the pedigree of the demigod by whom that more than herculean labour may have been carried out. And certainly there is nothing in the co-operative principle itself, either in its true meaning or in its vulgar adaptation as a synomym for cash payment, to the application of which to such an end I could for a moment be tempted to object. Co-operation is a most excellent principle; domestic sanitation a most admirable end. The mistake is in supposing that the two have any natural or indeed any conceivable connection. Let me take a rapid glance at the four schemes for its application now before us, and then state briefly my reasons for gravely doubting whether not only they, but any other plan of a similar kind, can possibly issue in anything but injury to the cause they profess to promote.

The first of these schemes, though coming before us with the somewhat imposing title of 'the Householders' Sanitary Asssociation', has for its more immediate object a very modest, though at the same time a very practically useful reform, viz., the periodical cleansing of the water cisterns of its intended members. It is formed, we are told, under the auspices of a leading member of the Sanitary Institute of Great Britain, for the purpose of providing efficient sanitary supervision of private dwelling-houses, supplying what may be necessary, and relieving householders, in short, where permitted, from all anxiety and trouble respecting drainage, ventilation, and water-supply. But whilst this is the ultimate and comprehensive object of this Association, they have determined, at first, to confine their attention to the water question, with a view to lessen the evils arising from storage in unhealthy tank or cistern, and to this end it is proposed, as a first step, carefully to examine and purify the chief water-tank or cistern and its surroundings in every dwelling-house, *as far as practicable*, for which the charge of five shillings would have to be paid to the Association at Christmas next, when the cistern should be subjected to the same process, and again repeated every three months during the coming year. The charge for such attention and service would be at the rate of one guinea per annum. As a rule, we are told, a quarterly inspection and purification will be found sufficient; but in exceptional cases, and whenever extra service is required, the charges would be in the same proportion. And no doubt but the object here proposed is a most excellent object, and there are probably hundreds, if not thousands of householders, who would gladly pay a guinea a year to an anonymous, but 'leading member of the Sanitary Institute of Great Britain', who should effectively relieve them of the trouble of mounting every three months a pair of steps, and peering into their cisterns for themselves. Some, on the other hand, might be glad to know beforehand who the anonymous 'leading member' may be, and what patented appliances for the complication of drains and the intensification of stenches he may eventually prove to have an interest in recommending to the confiding members of his 'Association' into whose premises he may once have succeeded in making good his anonymous way. And this desideratum, our second scheme, the 'Sanitary, Inspection, Protection, and Assurance', meets, it must be confessed, in very simple and straightforward fashion. 'Although,' says the prospectus of this ingenious undertaking, 'companies have been floated for sanitary inspection, and associations formed for sanitary protection and assurance of our houses, it may be asked whether good results may not be obtained without all the paraphernalia of directors, bankers, solicitors, consulting and inspecting engineers, secretary, on the one hand—and president, vice-presidents of the council, consulting and resident engineers, secretary, and treasurer—on the other:—from the advice of one specially qualified to direct and intelligently supervise, so that the work in connection with the proper sanitary arrangements of our dwellings should be sound in principle as well as in execution.' And so, after two or three pages of extracts from the *Sanitary Record*, *Times*, *Standard*, *Telegraph*, and so forth, duly setting forth the fatal consequences of an insanitary condition of affairs, we come to the consolatory assurance that 'to those that wish to be instructed it can be shown how simple are the first principles of sanitary science; that rooms may be ventilated, soil-pipes kept clear of sewer gas, gas stoves and fire places made perfect, water softened and filtered, without resorting to the numerous patented inventions foisted on a too credulous and ignorant public,—and that in a house not specially built for these improvements;' and that 'the fees charged for inspecting and reporting upon dwelling-houses should be based upon the rental and time occupied, and should the report state that the premises are in a satisfactory condition a certificate of the healthiness of the premises will be given.' When I add that the whole affair—inspection, report, practical carrying out of inspectors' scientific recommendations, and authoritative certificate that the scientific recommendations have been practically and efficiently carried out—is to be the work of an enterprising plumber, I have surely said enough to show the advantage of the scheme to all concerned.

The 'Sanitary Assurance Association' and the 'London Sanitary Protection Association' are schemes of a somewhat different character. The former starts with an 'Honorary Council', including such names as those of Sir Richard Temple, Bart.; Major-General Sir Garnet Wolsely, K.C.B.; R. Brudenell Carter, Esq., F.R.C.S.; R. Farquharson, M.P.; Professor E. Frankland, F.R.S.; Captain Douglas Galton, C.B., F.R.S.; J. Norman Lockyer, Esq., F.R.S.; Professor G. Rolleston, M.D., F.R.S.; Wm. Spottiswoode, Esq., President of the Royal Society; Professor John Tyndall, F.R.S.; John Whichcord, Esq., President of the Royal Institute of British Architects; etc.; and an 'Executive Council' consisting of Sir Joseph Fayrer, K.C.S.I., M.D., F.R.S.; George

Aitchison, Esq., B.A., Fellow of the Royal Institute of British Architects; W. H. Corfield, Esq., M.A., M.D., Professor of Hygiene and Public Health, University College; F. De Chaumont, Esq., M.D., F.R.S., Professor of Hygiene, Army Medical School; Mark H. Judge, Esq., Curator of the Parkes Museum of Hygiene; T. Hayter Lewis, Esq., F.S.A., Professor of Architecture, University College; Henry Rutherfurd, Esq., Barrister-at-Law; and T. Roger Smith, Esq., Fellow of the Royal Institute of British Architects. It has been formed, its prospectus tells us, to promote the application of sanitary knowledge to dwelling-houses, the chief object in view being to apply the combined sanitary knowledge and experience of medical men, architects, and others, by means of specially qualified officers, who shall yearly inspect the houses of members and subscribers and report upon their drainage, water-supply, and ventilation, on such terms as may include the dwellings of all classes of the community. The Association, we are told, will enable every member and subscriber, for a moderate fee, to have the sanitary condition of his house reported on yearly by those specially skilled in sanitary matters, and to this end members and subscribers alike contribute an entrance fee of half-a-guinea, and an annual subscription of half-a-guinea, after which, on payment in accordance with the graduated scale, they are entitled to have one house in London placed on the Assurance Register. Every such house is to be thoroughly inspected by the Officers, who will supply the member or subscriber with a written report thereon, specifying what work is required to put the house into proper condition, so far as drainage, water-supply, and ventilation are concerned; and after a house has been reported on, and the member or subscriber has had the work done by his own builder, to the satisfaction of the officers of the Association, certificates will be granted, and thenceforth such house will be inspected yearly upon the terms of a specified scale.

The second of these Associations has no share capital, and cannot, under its articles, be used for any purposes of profit. The Council, the members of which give their services gratuitously, consists of Professor Huxley (President); J. S. Bristowe, Esq., M.D., F.R.C.P., President of the Society of Medical Officers of Health; Sir William Gull; Rev. Prebendary Harry Jones; J. Burdon Sanderson, Esq., M.D.; Alfred Wills, Esq., Q.C.; and other distinguished persons; and each member is to be entitled to the following privileges:—1. A report by the Engineer of the Association on the sanitary condition of one dwelling, with a sketch diagram of pipes, and with specific recommendations, if necessary, as to the improvement of drainage, water-supply, and ventilation. 2. The inspection of any alterations in the sanitary fittings, which may be carried out by the advice, or with the approval, of the officers of the Association. 3. An annual inspection of his premises by the Engineer, with a report as to their sanitary condition. 4. Occasional supplementary inspection and advice concerning the dwelling in respect of which he is a subscriber, whenever this advice may be desired, on payment of a small supplementary fee on each occasion that an officer of the Association is called in; the fee for such occasional advice being fixed from time to time by the Council. 5. Reports by the officers of the Association as to the sanitary condition of any dwellings designated by any member, or of any plans for proposed buildings, on payment of a fee to be fixed by the Council from time to time, with special relation to the rent of the premises to be inspected, etc. And for these advantages the entrance fee, which entitles to the privileges of membership for twelve months, is £2 2s. for all dwellings rated at less than £400 per annum, and situated within five miles of Charing Cross. The subsequent annual supscription in respect of these dwellings is £1 1s.

Now, with every possible respect for the distinguished names attached to the prospectus of this notable scheme, I would ask its promoters, do they really think that it contains even a conceivable potentiality of practical success? Of course, to a mighty scientist like Professor Huxley, or a fashionable physician like Sir Wm. Gull, the humble architect who comes down to superintend the sanitary arrangements of his £500 a-year palazzetto at Chiswick is just 'the man about the drains', and the 'consulting engineer' from Edinburgh 'the other Scotch fellow, you know,' who comes to help him. But do they really think that a plumber—or a plumber's boy—from the Edgware Road would find it worth while to meet a fellow plumber—or plumber's boy—from the Canongate, on the terms here proposed? The thing is simply absurd. In point of fact, the subscribers to these ingenious schemes are altogether on a wrong track. The co-operative principle is a most excellent principle in its way, as mercury or colchicum are most excellent drugs. But it will no more meet all conditions than mercury and colchicum will cure all complaints. When a number of men combine to purchase a chest or a cargo of tea for cash direct from the docks, instead of running up a bill for it at the grocers by the half-pound at a time, they of course economise, not only the grocer's profit, but a considerable portion of his expenses and the whole of his necessary insurance against bad debts, indiscreet investments, and unsaleable stock. But there is no wholesale and retail in the educated brainwork of a professional man. All that co-operation can hope to do in such a case is, by providing a large quantity of work, to get that work upon starvation terms. But it surely does not require the brain-power of a Huxley or the knowledge of a Gull to see that even under such conditions those terms will be accepted only by those who but for their acceptance would starve.

C. W. A.

TABULAR STATEMENTS AS TO SICKNESS.

I find myself in some difficulty with regard to the table of 'new cases of sickness coming to the knowledge of the Medical Officer of Health', now required by the Local Government Board to be appended to annual reports. The figures given are to be derived from the 'returns of Poor Law Medical Officers, from the practice of public institutions in or near the sanitary district, and from other medical practice'. This information is not, however, sent to me voluntarily, and I do not see how I am to get it, or to fill up the table. I should be glad of your help in the matter.

PERPLEXED.

[Every Medical Officer of Health should certainly be regularly furnished with information as to pauper sickness in his District. This information is valuable to him, not only as an index to the prevalence of non-fatal disease among all classes in the sanitary district, but as giving him occasion to exercise useful and immediate sanitary supervision over localities which are most apt to require such supervision. The Sanitary Authority are empowered to pay the Clerk

to the Guardians a reasonable sum for the supply of this information, and it would be well to draw their attention to the matter. As regards cases occurring in hospitals, no doubt, on application to the proper authorities, Medical Officers of Health would usually, on explaining the grounds of their request, be permitted to examine the hospital books for the purpose of ascertaining the cases belonging to their Districts. If, however, this is refused, the table must remain so far incomplete. It is of course not supposed that a Medical Officer of Health can, in general, obtain any complete lists of cases occurring in practice; but it is probable that he will have information of some such cases, and the Local Government Board have considered it desirable that the table should contain a record of these. This is the more desirable since in many districts, either voluntarily, by arrangement with the local practitioners, or compulsory under Local Acts, arrangements are now made to procure this information, so far as some diseases are concerned.—ED.]

THE INFECTIOUSNESS OF TYPHOID FEVER.

I am a constant reader of the SANITARY RECORD, and derive much benefit and instruction, as a Nuisance Inspector, from the perusal of its pages. Nevertheless, from the experience I have had since my appointment to the above office in 1872, in connection with zymotic or infectious diseases, I often come across articles written by gentlemen, learned, and who stand high in their profession as medical men, and sometimes read papers before a number of students or a company of professional men of the same standing as themselves, who boldly deny that typhoid fever is an infectious disease. When I was first appointed to be inspector, I had instructions, as to how I was to act, from the Sanitary Medical Officers that were above me; in the event of having occasion to visit a patient attacked by any zymotic disease, as to the best way of guarding myself and others from propagating such diseases; but, with respect to typhoid fever, I was informed that it was not infectious. This puzzled me at the time, and I ventured to doubt the assertion, but was further informed that it was generally believed by the profession that it was not infectious.

Not long after this a case of typhoid took place in one of our districts, which nearly proved fatal. Two or three other persons in the same and the adjoining houses took the disease, but in a slight or mild form. On visiting the place with the Medical Officer of Health, I appealed to him whether, in this instance, the theory of non-infection was not upset. He said it had that appearance, but, as the latter cases were so slight, we could barely decide that point.

Soon after this we had another case, on a hilly brow in an isolated house, at an elevation of about five hundred feet above the level of the sea. A young woman, aged 17, was the first case, which proved fatal. Two brothers and a sister took the disease, which also proved fatal to one of the brothers. This circumstance took place in a well-ordered house, where there was no want of the comforts of life in food or clothing. During the commencement of the illness of the first young woman, a friend of hers, a girl of about fifteen years of age, paid her a visit, and stopped with her about two hours. This girl, although she lived in an isolated house, high in the mountain, about three miles off, took the disease home with her, gave it to two other sisters, and two of them died. The question will here arise as to how the first of these cases caught the infection? That, in my opinion, is soon told. On a certain day she paid a visit to a cousin, who lived about nine or ten miles off, who had been poorly with rather a heavy attack of cold, there being no suspicion of fever. On the next day she fell ill of what proved to be typhoid.

Again, a labouring man, with a wife and two children, living in another locality in this district, lost his wife by typhoid fever in the month of November (not last year). Being left with two motherless children, he packed up his effects and returned to his father's home to live. There were here two grown-up brothers and a sister. In the April following, the bed-clothes, etc., of this man were opened and spread out to be aired, which resulted in the two brothers and sister taking the disease, of which one brother and the sister died. The house where these people lived was on a rising ground, there were other houses below, and the sewage from the above house ran in an open gutter within about four yards from the lower houses, in one of which lived a poor family, consisting of husband, wife, and daughter aged 15. This girl took the disease, and subsequently her mother also took it, and died after her confinement, which was near. The girl recovered. Another neighbour, a woman who attended these last, took it home and gave it to her boy, aged 14 years, who also died of it. The mother escaped the illness. A brother of the first man that lost his wife, who lived about a mile off from his father's, although he refrained as much as possible from visiting his relations, took the disease home, and two of his children had it in a slight form.

In another instance, the wife of a farmer, in another locality, was attacked by typhoid fever, and was ill about four weeks. During her illness a sister occasionally visited her. She conveyed the infection home, a distance of three miles, where three persons had the fever severely, but recovered. From this second house it was carried by friends two miles further, where four more persons were attacked by the same fever, but not in so severe a form, and they recovered. In the meantime, two sons of the above farmer, who came from school for a few days' holiday, took the disease rather heavily, but recovered. During their illness, the sister of the farmer's wife, already referred to, came to wait upon them. She sickened and died soon after of typhoid. Before her death, one of the servant girls was attacked, and was sent home. She had a very severe attack, but recovered. In the meantime, four of her brothers and sisters contracted the disease. They had it but slightly, and soon recovered.

In concluding, I beg your indulgence, as well as that of the learned medical profession, being only a Nuisance Inspector, for attempting to make these cases public in the face of the different opinions of medical men. My only reason for doing so is to try to get professional men to reconsider this matter. Far be it from me to presume that I know more on this matter than they do; I only point to facts that I had to deal with officially, and I can quote some other cases if required. I may state here that an interval of about two years elapsed between each of the above cases, and each of them can be well authenticated, as more than one medical man has seen nearly all of them; but hesitation, on account

of my humble position, had prevented me from making them known sooner.

HUGH DAVIES,
Rural Sanitary Inspector, Wrexham District.
Wrexham, June, 1881.

THE VENTILATION OF SEWERS.

It has been suggested to me by a member of the Walsall Urban Sanitary Authority that I should send you this. Our wish is that you would kindly open your columns for any information on the ventilation of sewers we can obtain.

1. As to ventilation of sewers by pipes opened into gas-lamps—has it been done? and, if done, found to be successful? 2. Can any one give us information as to whether or not the sewer gas opening into the gas-lamp would deteriorate the illuminating power of the gas? To me, on first consideration, without experiment, it appears it would.

C. W. STEPHENS, Sanitary Inspector.
Walsall Borough Offices, May 30, 1881.

ADULTERATION IN AMERICA.

In an editorial article in your journal for April 15th of the current year, you refer to the sensational statements that have been made and published at various times by George T. Angell of Boston, Mass. I hope that for the good name of America these statements will be taken *cum magnifico grano salis*. While we must all admit that adulterations of food of a fraudulent character do exist to some extent in this country, adulterations of a poisonous character are, I believe, comparatively rare. Mr. Angell's statements are eminently sensational, and the correctness of many of them has been denied absolutely by professors and chemists at the Universities and Colleges of Boston, New Haven, and New York. In some of his assertions he named certain chemists as authorities for them, and these very chemists afterwards confronted him and denied ever having made such statements. His assertion that commercial glucose sugar made from corn-starch contains poisonous substances is absolutely denied by experienced chemists, who are in no way commercially interested in it, and who have investigated the subject very thoroughly.

The true friends of sanitary reform are apprehensive lest these exaggerated assertions of Mr. Angell will have the effect of producing a decided reaction against the proposed Adulteration Act.

REUBEN HAINES.
Germantown, Philada., Pa., April 28, 1881.

THE REGISTRATION OF DEATHS IN WORKHOUSES, ETC.

Having had a good deal of trouble with some of the Registrars in my districts, who would not give me full details in connection with the deaths in workhouses, etc., I wrote to the Registrar-General for a copy of the instructions of December 30th, 1880, but was informed that there were none left. I then borrowed a copy from one of the Registrars, and, by quoting in my letters to the defaulting Registrars the words of the instructions, I induced them to give me full particulars. It seems likely that other Medical Officers of Health may be troubled in the same way, and I should think it might prove useful if the letter of the Registrar-General were printed in the SANITARY RECORD. The paragraph numbered 5 was that which I found most important.

HUGH REES,
Medical Officer of Health, Carnarvonshire Combined Sanitary District, June 8th, 1881.

[COPY.]
General Register Office, Somerset House.
December 30th, 1880.

SIR,—Inasmuch as it is desirable, for a variety of purposes, that it should be possible to ascertain from the birth and death Registers the numbers of births and deaths registered from time to time in the several Urban and Rural Sanitary Districts of England and Wales, I have to request you to carry out such of the following instructions as may be applicable to the circumstances of your sub-district:—

1. If your sub-district contains no Urban Sanitary District, nor any part of an Urban Sanitary District, it follows that the whole of the sub-district belongs to a Rural Sanitary District, and the letters R. S. D. should be entered in Column 1 of each entry in your birth and death registers, after the 'Place of Birth or Death.'

2. In case your sub-district contains an entire Urban Sanitary District, or a portion of an Urban Sanitary District, the letters U. S. D. should be added in Column 1, after the 'Place of Birth or Death', in each entry of a place of birth or death occurring within such Urban Sanitary District, whereas the letters R. S. D. should be so added in every entry relating to births and deaths occurring in other parts of the sub-district belonging to the Rural Sanitary District. Thus, in cases of births and deaths occurring in a parish, part of which is situated in an Urban, and part in a Rural Sanitary District, the letters U. S. D. or R. S. D. would render it possible to distinguish the entries belonging to these respective portions of such parish.

3. Whenever practicable, the *name* of the Urban Sanitary District should appear in Column 1 of the birth and death Registers, followed by the letters U. S. D. This will not, however, be necessary in cases in which the *whole* of a sub-district is situated within one Urban Sanitary District; but the letters U. S. D. should be added after the place of birth or death in every case.

4. When a sub-district contains more than one entire Urban Sanitary District, or portions of more than one Urban Sanitary District, it will be necessary to see that the name of such District forms part of the description of the place of each birth or death, followed by the letters U. S. D.

5. In order that it may be possible to distribute the births and deaths occurring in PUBLIC INSTITUTIONS among the several Sanitary Districts to which they should be referred for statistical purposes, it is necessary that, in the case of births, the PREVIOUS RESIDENCE of the *mother*, and, in the case of deaths, the PREVIOUS RESIDENCE of the *deceased person*, be added to the Register. Therefore:—

(*a*) In the case of births, the previous residence of the mother should be added after her maiden name in Column 5.

(*b*) In the case of deaths, the previous residence of the deceased should be added after the rank or occupation in Column 5.

The 'previous residence' should indicate, whenever practicable, the name of the Sanitary District, or, if this be not ascertainable, of the parish.

I desire that you will carry out these instructions with regard to all entries of births and deaths made on and after 1st January, 1881, and, in case you experience any difficulty in the matter, an application for further instructions shall receive my immediate attention.

I also request that you will insert in the accompanying form the name of each Urban Sanitary District, any portion of which is situated within your sub-district, adding after each name the words 'entire' or 'part of' as the case may be.

I am, Sir, your obedient servant,
BRYDGES P. HENNIKER, Registrar-General.

To the Registrar of Births and Deaths.

SANITARY INVENTIONS.

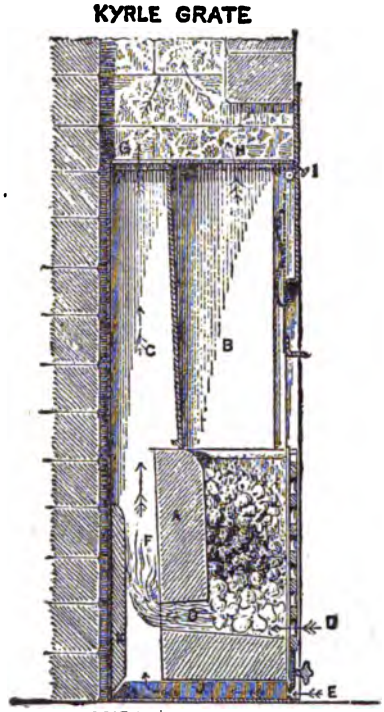
THE COALBROOKDALE COMPANY'S NEW SMOKELESS OPEN FIRE-GRATE, THE 'KYRLE'.

The Coalbrookdale Company of Coalbrookdale, Shropshire—of whom the county may be justly proud, for their contributions from time to time to art work in iron; irrespective of cost, and we may also add, in many instances with an utter indifference to profit, that is rarely to be found in commercial enterprise—have recently introduced a new grate to burn anthracite coal, which, out of compliment to the Society which has, in connection with the National Health Association, inaugurated the question of smoke abatement, they have named the 'Kyrle'. It is unnecessary for us to reopen the question as to the value of anthracite over bituminous coal, or as to the desirability of urging upon manufacturers the necessity of endeavouring to produce grates that will consume their own smoke, whatever fuel may be used in them. We have already adverted to other new grates produced with this object. We now give a description of the 'Kyrle', with a hope that the Coalbrookdale Company will lend their aid when the Exhibition of Smoke-Consuming Appliances opens at South Kensington, by exhibiting this and other grates they manufacture having a similar object in view. Our first illustration represents a sectional view, and the other a full front, or elevation. The improvement, which may be adapted to almost any open fire-grate, lies in the back arrangement, which is however, remarkably simple. A hole about 10 in. by 2 in. is made in the bottom of the brick, just above the solid bottom of the fire, which aperture communicates with a supplementary flue at the back, The draught draws through the lower part of the fire into this supplementary or back flue, whilst the upper portion of the fire draws through a small aperture in the top-plate which occupies the place of the usual register door. The two flues meet just above this point and join the chimney proper, thus a high degree of temperature is raised and maintained. A damper at the top regulating this, a sliding blower in front, which, however, is only necessary when the fire is in process of lighting.

Although no smoke arises from the combustion of anthracite, a certain amount of carbonic oxide is generated, and to consume this within the grate and prevent its escape into the room, a provision is made whereby a certain modicum of air is introduced through the ashpan under the bottom brick, which, combining with this carbonic oxide, burns in the back flue.

The patentee (Mr. Parker) claims to have produced a smokeless open fire-grate; an economic user of anthracite, etc.; a grate capable of using successfully what is now in large places regarded very much in the light of refuse—gas coke; a grate, which though specially prepared for burning these fuels otherwise difficult of combustion will, nevertheless, burn in an improved manner ordinary gaseous or house coal.

KYRLE GRATE



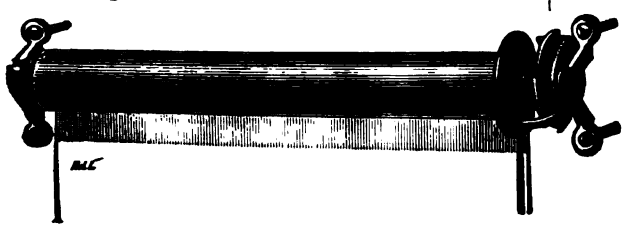
SECTION THROUGH CENTRE

At Tunstall (Staffordshire), Robert Berwick, colliery manager, has been fined £10 for neglecting to report an explosion which took place in the pits; £5 for allowing loose gunpowder to be taken into the mines; and £2 and costs for allowing lights other than safety lamps to be used, for not causing adequate ventilation, and for not reporting the existence of gas, as required by the Mines Regulation Act.

Mr. Henry E. Armstrong, M. O. H. for Newcastle, has also been appointed M. O. H. to the Tyne Port Sanitary Authority, *vice* Dr. Bramwell, resigned.

AMERICAN DOMESTIC INVENTIONS.

About three years since, when American hardware goods began to appear in London and other large towns in considerable quantities, a large amount of interest was manifested in them by English makers and shopkeepers, and a lively discussion ensued upon their relative merits. At the same time much astonishment was expressed at the ingenuity displayed in many of the articles, the superiority of others over English goods of a similar class, and the general lowness in price at which the bulk of them were sold. Notwithstanding that our manufacturers, spurred to exertions by the introduction of the transatlantic novelties, have since been enabled to compete successfully with some of the more important items which, unchecked, would almost have annihilated one of our popular industries, it is nevertheless a fact that with all the activity displayed in manufacturing centres, the quantities of American goods placed on our markets continue to increase, and depôts for their sale are to be found in our leading thoroughfares, and in those of other large cities, such as Liverpool, Manchester, Glasgow, etc., while London is made the centre from which these goods are distributed through our colonies and other parts of the world. Amongst the articles our 'American cousins' have sent here in large quantities, and with which we have certainly not been able to compete as regards price, are what is commonly known as 'self-acting blind furniture', consisting of the roller, lath, brackets to hold the former, and the 'action', by which we mean the mechanism that raises or lowers the blind. One firm, Messrs. H. L. Judd and Co., of New York and other cities in the United States, have made blind furniture a speciality, have succeeded in perfecting these articles to such a simple form that they can be sold at a price probably lower than the commonest articles made to work with the cord and rack pulley in this country. Mr. M. F. Rust, the indefatigable English representative of the firm, has already secured considerable popularity for the house, and has located himself at 78, Fann Street, Aldersgate Street, where the varied productions of Messrs. Judd and Co. are to be seen, including the new 'Empire' blind set, which we have illustrated. Designed to meet the requirements of the English market, it has been pronounced by one of the largest blind furniture makers in the metro-



polis 'a great success'. The engraving depicts it as made to fix overhead, in the same position in which a venetian blind would be placed, but it is also supplied to fix on the front of the window frame, or on the laths at the sides, another arrangement having in addition just been completed that may be used in any of the three positions. These articles are supplied of such a length of roller and lath that they are sufficiently long for the widest window, and when required shorter, the roller can be cut at the one end, and the bracket readjusted, by which all working contingencies are provided for. The action of the 'Empire' is simplicity itself, and is distinguished from the previous productions of this class of work, in so far that the blind can be drawn down without touching the cord, an advantage that will be appreciated by those who have used the older kind where the ratchet had to be unlocked by pulling the string. There are only four cogs in the ratchet, the space between each representing a quarter revolution of the roller, and, by simply pulling the cord, the blind rolls itself up silently and instantaneously. The mountings are of iron, electro-bronzed, and there is nothing that can get out of order. The entire set, ready for the blind to be put on, may be purchased retail for certainly less than a shilling. In a future number we shall describe some other inventions of Messrs. Judd and Co.

RUSTLESS IRON.

In our report on the 'Building Exhibition' in last month's SANITARY RECORD, we referred to the exhibits of rustless iron of the Rustless and General Iron Company, Queen Street Place. The specimens at the Building Exhibition were produced by the Barff process, which practically consists in producing all over the surface of the iron a coating of magnetic oxide, by exposing the iron at a high temperature to the action of superheated steam. Soon after Professor Barff introduced his process to public notice, Mr. Bower, the world-known gas engineer of St. Neot's, obtained a patent for the production of a similar protective coating, only using air instead of steam. After numerous and costly experiments, Mr. Bower, as it were, duplicated or triplicated his process, and, popularly speaking, ended by first rusting and then unrusting the iron articles treated in his furnaces. Finding, however, that each process—the Barff or the Bower—had peculiar merits of its own, Mr. Bower purchased Professor Barff's patents, and now, by a happy union of certain portions of the once rival patents, he is able to produce a protective coating of magnetic oxide on either wrought, cast, or malleable iron, at a cost considerably less than that originally expended on working the patents separately.

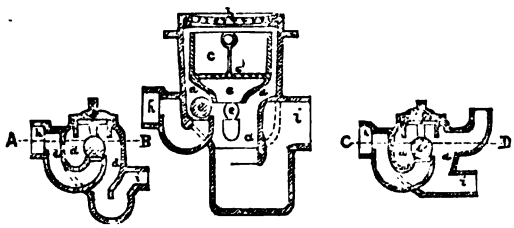
At the recent meeting of the Iron and Steel Institute Mr. Bower read a paper explanatory of the joint processes, which excited a very great deal of critical interest, and which elicited the fact that the Bower-Barff processes practically mark a new era in the history of iron. Thanks to the magnetic oxide protective coating, iron can now be used for water-closet basins, cisterns, pipes, and every sanitary purpose which can be conceived. The only drawback, but a fatal one, to the application of iron hitherto, has been its unfortunate tendency to rust. Now, we know for certain that it can be rendered absolutely rustless. Even where the protective coating has been purposely or accidentally removed the rust begins and ends at the unprotected spot; it will not spread. The new coatings are of themselves so artistic as to colour that it seems a pity to paint them. There are several shades which can be produced at will, according to the class of iron treated. The most beautiful dull or bright black, or the most delicate of French greys, can be obtained.

It is needless to say that at a meeting of such a society as the Iron and Steel Institute the most searching enquiry was made into the actual value of the processes, and the validity of the inventors' claims in their behalf. Specimens were exhibited that had been exposed to years' special tests—in the

open, exposed to all weathers, in the ground, and under salt and fresh waters. Most interesting and beautiful were the enamels, etc., which were exhibited by the French Company who have bought the continental patent rights, and some of the protected hammered work would have gladdened the heart of Quintin Matsys. Messrs. Bower and Barff have laid the sanitary world under a deep obligation by discovering and rendering economically and commercially practical a process by means of which the cheapest and most valuable of all the metals can be universally used, where, in times past, on account of its liability to rust, lead, zinc, and copper had to be employed.

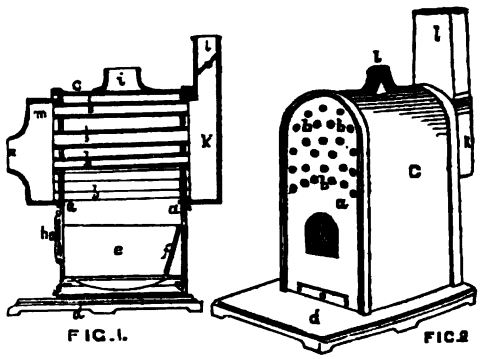
ILLUSTRATED SANITARY PATENTS.

3318. (1880.) SEWAGE TRAPS, ETC.: C. PERKS, M.D., BURTON-UPON-TRENT. [6d.]—The object of this invention is to prevent or considerably reduce the ingress of solid matter into the drains or pipes when used as a gulley, to prevent the choking of the traps, and to avoid the entrance of sewer and other gases into dwellings or other



buildings. Fig. 1 is a vertical section, Fig. 2 a plan with grating, tray, and valve removed, and Fig. 3 is a vertical section of the disconnecting chamber when the trap is not used as a gulley. When this trap is used in its entirety, as a gulley and chamber for disconnecting the different house-drains from the main house-drain and the sewer, as shown in Fig 1, a circular or other shaped trap-box or disconnecting chamber *a* is formed, with a grating *b* or perforated plate on the top, properly secured in place. Within such trap-box *a* is placed a removeable box or tray *c* without a top, having a finer grating c^1 for its bottom. This tray below its said grating c^1 has a funnel-shaped continuation, as shown in Fig. 1, so arranged as to protect the valves *e*. Below the bottom c^1 of the tray *c* is a continuation of the trap-box *a* for receiving the sewage or other liquids from the sink or other pipe or pipes *h*, as well as the liquids passing through the gratings *b* and c^1. These pipes *h* are provided at their entrance into the said continuation of the trap-box *a* with suitable valves *e*, which consist of a ball resting upon india-rubber, but other kinds of efficient valves may be used, the object of which valves *e* is to prevent the entrance of any matter, whether gaseous, liquid, or solid, into the pipes *h*, and through them into dwellings or other buildings. These pipes *h* are formed siphon-shaped, as shown in the drawing, or are otherwise effectually trapped either immediately prior to their entrance into the trap-box *a*, or in some other convenient part of their course. The tray *c* is made removeable, and can be replaced by a charcoal receptacle if necessary.

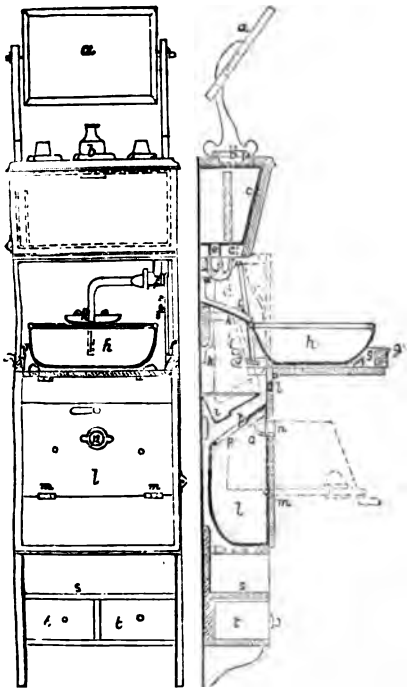
3979. (1880.) STOVES: W. SMITH, JUN., BARNARD CASTLE. [6d.]—This invention relates to that form of stove in which the flame and products of combustion are made to pass round and circulate outside a series of tubes, through which air is allowed to pass, such air becoming heated in its passage, and being then admitted into the room, building, or other place which it is desired to heat. Fig. 1 is a longitudinal section, and Fig. 2 is a perspective view. *a*, a^1, are parallel vertical plates having perforations at their upper parts, into which are fitted the ends of the tubes *b*, *b*, *b*. An outer casing *c* is fitted round the tubes and connects the plates *a*, a^1, together, its sides descending nearly or quite to the floor or base plate *d*, upon which the stove stands; *e* is a fireplace shown with sloping sides *f*, and having the grate *g* and the firedoor *h*. An opening is shown at *i* which communicates with a chimney, and is preferably provided with a damper (not shown in the drawing). *k* is an air chamber or receptacle surrounding the



ends of the tubes *b*, and having the flue *l*, which may be provided with a damper, and through which the heated air rises to the place to be warmed. In Fig. 1 a casing *m* is shown, surrounding the front ends of the tubes, and provided with an opening at *n* through which the air to be warmed is admitted to the stove, and which may also be provided with a damper, or instead of the casing *m* the front ends of the tubes may be left open, or they may be covered by an ornamental perforated plate. The action of the heating stove constructed and arranged as described, is as follows:—A fire having been lighted in the fireplace *e*, the flame and smoke circulate between and round the tubes *b*, *b*, *b*, and heat the air, which entering them at their front ends passes through them and escapes at the other ends into the chamber *k*, and thence ascends through the flue *l* to the place to be warmed. The smoke and products of combustion, after heating the tubes *b*, *b*, *b*, escape through the chimney *i*.

4013. (1880.) LAVATORIES: MESSRS. DE RUSSET, PRESTON, PRESTIGE, & PRESTON, DEPTFORD. [8d.]—This invention relates to lavatories and their fittings, where the object is to economise space, to promote cleanliness, and to effect economy in first cost and in the use of water. Fig. 1 shows a front elevation of a single lavatory fitted with looking glass, decanter and tumbler stand, cistern, soap and brush trays, cock for regulating the flow of water, washbasin, tilting slop container with lock and with spout for emptying, towel racks, and drawers, etc. Fig. 2 is a vertical sectional side view, and shows the measuring cistern with decanter removed to show the filling hole or holes and the air escape hole or holes and the lever or levers for actuating the regulating cock; also the slop container. In Figs. 1 and 2, *a* is the looking glass; *b*, decanter; b^1, filling hole; *c* is the top cistern; c^1, measuring cistern; *d*, one of the air pipes for the latter, and *e*, the passage forming communication from one cistern to the other through the regulating cock. f^1 is the lever, and f^2 the rod for working the cock *f* from prolongation of side of basin support *g*; *h* is the pipe leading the water from the larger end of the cock *f* into basin h^1; *i* is the sink, which may have a grating placed at the bottom; *k* is the soap and brush tray, with waste pipe k^1 leading to sink; *l* is the slop container hinged at *m*, and with outlet *n* and shield *o*, and washboard *p*, bumping pieces, in which india rubber washers are placed at *r* to stop the basin support when down, and afford the needed elasticity when the basin with its support is let down into the position shown in full lines in Fig. 2; l^1 represents a latch for the slop container to hold it in the position shown; *s* is a shelf for general purposes, and *t*, *t*, are drawers for towels or brushes, etc. The action of the apparatus is as follows:—The full lines, Fig. 2, show the basin h^1 ready for use; after use the basin with support is lifted up into position, shown by dotted lines in Fig. 2; a latch is shown at g^1 to keep it in that position, similarly the latch l^1 for the slop container, but any other

convenient form of latch may be used, or the latch may be dispensed with; this empties the basin into the sink *i*, through bottom of which the slops fall into the slop con-



tainer *l*; at the same time the communication in the cock *f* between basin h^1 and measuring cistern c^1 is closed, and the way opened between top cistern *c* and measuring cistern c^1, the cock *f* being arranged so that the two ways cannot be opened at one and the same time; the measuring cistern will now fill, whereupon the apparatus will be ready for use again.

4027. (1880) APPARATUS FOR CHECKING WASTE OF WATER: B. J. B. MILLS, LONDON, FOR E. E. FURNEY, ST. LOUIS, U.S. [6d.]—The invention consists in a device to be used in connection with a hydrant or discharge water-pipe, and cock or valve to stop the water-discharge, after it has run a certain time to prevent or check the waste of water. Under one form, the apparatus consists of a cylinder or case through which the water passes, and which contains a cylindrical cup, forming a gravitating valve to stop or check the flow of water, and which has in the bottom a valve port or orifice, with a ball-valve of less specific gravity than the water, so that its floative character will tend to keep it in contact with the valve-seat. In the valve-cup or cylinder, is an automatic valve of greater specific gravity than water, and which fits the interior of the cup. When the water is flowing through the apparatus, the valve aforesaid is gradually raised by the water entering through the port of the ball-valve, the ball-valve not quite closing the port. When the upwardly moving valve has attained a certain elevation, it reaches its seat and closes the eduction port of the apparatus, and stops the flow of water until the hydrant or discharge cock is closed, and the pressure being thus equalised above and below the stop-valve it subsides, and a subsequent opening of the discharge cock results in another flow of water. There must be a slight leak in the stop-valve to allow the equalisation of the water-pressure above and below, and the closing of the discharge cock. Under another modification, the apparatus is constructed with a bottomless cylinder moving within a casing, and an inverted cup moving within the cylinder actuated by the water-pressure so as to alternately cover and uncover radial openings in the cylinder in such a manner as to cause the closure of the discharge opening after a certain period or quantity of flow, and permit the free return of the parts to their original or normal position after the outlet cock has been turned off. *Claim* 1. In an apparatus for checking the waste of water, a checking valve or stopping piston actuated by water admitted through a contracted

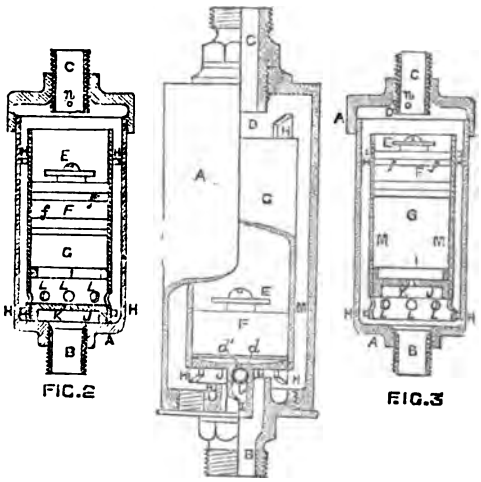


FIG. 2 FIG. 3

FIG. 1

orifice, and adapted to close or nearly close the eduction port after the passage of a certain amount of water by the difference in pressure on its opposite sides, in combination with a passage from the eduction to the induction pipes, and a valve for partially resisting the flow of water through said passage substantially as set forth. *Claim* 2. The automatic valve F gradually closed by the passing water, and opened by the closing of the discharge cock of the water pipe or other discharging orifice. *Claim* 3. The combination of outer cylinder or case A, cylindrical valve or cup G, and valve F, working as a piston in cylindrical valve G, valve seat D and water orifice *d*, closed or partly closed by valve J. *Claim* 4. The combination of cylinder or case A, cylinder G (whether fixed or moving), automatic valve F, and valve and port (or passage) J, *d*, with small water passage in the bottom of cylinder G, for the purpose set forth. *Claim* 5. The combination with the case A having induction and eduction openings, and cylinder G therein, of the orifice L in said cylinder and piston J, actuated by water pressure to direct or stop the flow of water through the orifices. *Claim* 6. The combination of case A, cylinder G moveable therein, water orifices L, piston J with opening K, and piston F, with valve E closing the eduction opening C. *Claim* 7. The combination with the piston F of the circumferential surface or surfaces *f* devoid of capillary attraction for water, for the purpose set forth.

4067. (1880.) CLOSETS AND ASHPITS: J. R. PICKARD, LEEDS. Fig. 1 is a front elevation of a pair of closets, Fig. 2 a sectional elevation on the line A B Fig. 3, and Fig. 3 is a plan view of Fig. 1. G, G, are the closets; H is the ashpit, in which are screens J, J, sloping down and resting on walls K, K, which form a pit L for the reception of rough rubbish, such as pots, clinkers, and the like materials; M, M, are the excreta pits; by this arrangement the main body of the ashes are separated from the refuse without manipulation and additional labour, the whole of the ashes falling on to the inclined grids, grates, or screens J, J, placed so that the finer ashes or dust fall through the screens on to the excreta and effectually deodorise it; the coarser material being precipitated from the inclined screens J, J, into the pit L, is kept apart from the excreta, which is thereby more valuable for tillage; N, N, are the doors for the entrance of the ashes; P, P, are the doors provided for the removal of the fine ashes and excreta: R is the door through which the clinkers and rubbish are removed. The garbage from the ashpits is collected and placed along with the market garbage in the charring furnace shown at Figs. 7 to 13, in which S is the oven for

the garbage; T is the flue from the furnace T^1 to the chimney; V is the chimney shaft; W is the entrance or opening or oven S; X is the aperture for the escape of noxious

FIG. 1.

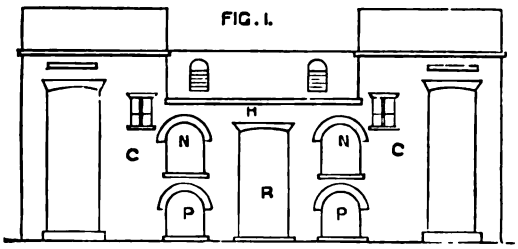


FIG. 2.

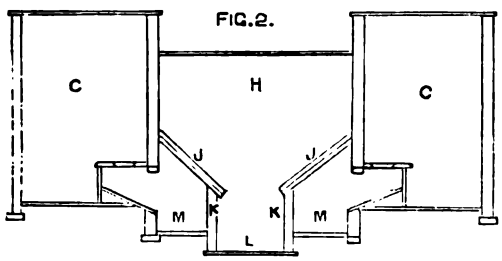
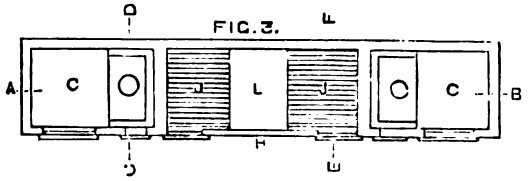


FIG. 3.



gases, which pass through the fire before entering the flue or chimney V; the charcoal from the above can be used and sold for numerous purposes.

4124. (1880.) IMPROVEMENTS IN APPARATUS FOR VENTILATING SEWERS, ETC.: T. H. MITCHELL STRAWBERRY HILL, MIDDLESEX. [6d.]—This invention has for

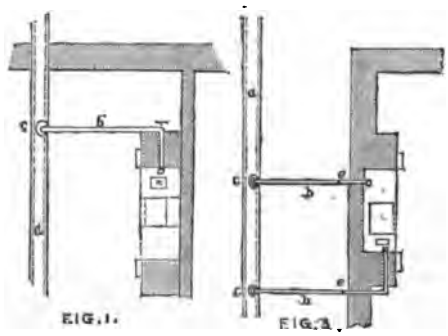


FIG. 1. FIG. 3.

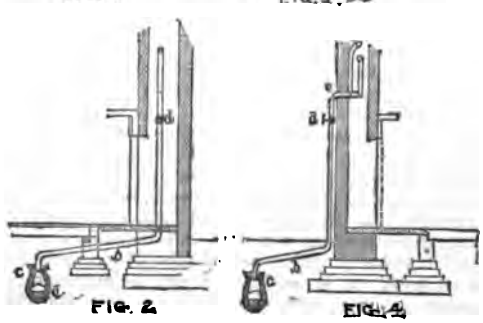


FIG. 2. FIG. 4.

its object the abstraction from sewers, cesspools, drains, and other places of a like nature, of noxious gases, and thereby preventing such gases from getting into houses, streets, and other public places where their presence is dangerous. He effects this object by making suitable pipe-connections from the drain, to the chimnies of houses and to the ash-pits of furnaces in factories, whereby the noxious gases are drawn from the drain and carried to the chimneys, and from thence pass into the atmosphere. He connects such pipes by means of a funnel-shaped junction next to the drain, suitably attached thereto, such junctions being either provided for in the formation of the drain-pipes, or cut into the drain at suitable intervals. The funnel-shaped junction pieces are inverted, that is to say, the larger end is placed on the top of the drain, and the smaller end is attached to a suitable pipe or pipes, and continued underground until at a convenient spot it emerges, and is continued into the chimney or chimnies of houses, and is carried a few feet up such chimneys, by preference the chimney which is most used, such as the kitchen chimney. At some point convenient for access below the connection of the ventilating pipe with the chimney or ashpit he places a suitable cock, in order that, if necessary, the passage of the sewage gas from the drain may be entirely stopped. Fig. 1 is a plan, and Fig. 2 a sectional elevation showing the mode of applying this invention to the flue of an ordinary kitchen range in case the drain runs under the house. *a* is the sewer, underground; *c* is the cone which connects the sewer with the flue by means of the pipe *b*. A stop valve is placed on the pipe *b*, as shown at *d*, Fig. 2. Fig. 3 is a plan, and Fig. 4 a sectional elevation showing the mode of applying this invention to the flue of a kitchen range, where the drain is outside the house. The pipes *b*, *b*, are carried up the outer wall, which wall they enter at *e*, *e*, as shown, and pass into the flue. Stop valves *d* are placed for convenience outside the house.

4916. (1880.) HEATING AND VENTILATING: W. LOVE, GLASGOW, N.B. [6d.]—This invention has principally for its object the construction of improved apparatus for heating and ventilating by means of oil lamps, such apparatus being applicable with little or no modification for heating and ventilating by means of gas. The invention also comprises improvements in the oil-lamp details, which are applicable not only in connection with the heating and ventilating

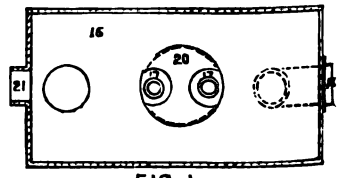


FIG. 1.

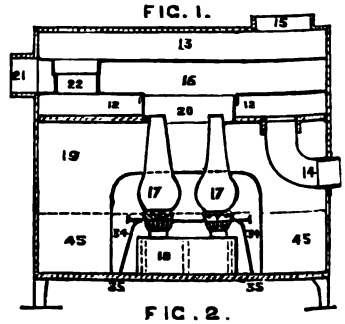


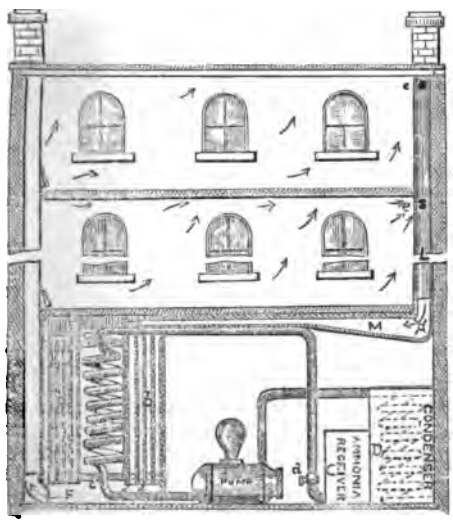
FIG. 2.

arrangements, but also when the oil-lamps are used for lighting purposes. Figs. 1 and 2 are horizontal and vertical sections of a first modification of heating and ventilating stoves. The casing and other parts of the stove may be made of sheet iron, or of cast iron, and when an ornamental exterior is desired the casing may be covered with tiles. The stove is of a rectangular form, and internally the upper part of the casing is divided by partitions into a series of flat shallow horizontal chambers 12, 13 communicating with each other, and the lowermost one 12, receiving fresh air from the outer atmosphere by a pipe

or flue 14, whilst the uppermost one 13 has one or more outlets 15, by which the heated air passes into the apartment. In the interval between the air-chambers 12, 13, a space 16 is formed for the gaseous combustion products, and when the stove is constructed, as may often be the case, with more than the two air-chambers 12, 13, spaces for the hot gases, like the space 16, will be arranged alternately with the air spaces. The lamps 17 and oil reservoir 18 are placed in a closed chamber 19, forming the lower part of the stove, and the hot gases pass from the lamps by a passage 20 formed through the lower air-space 12 into the hot-gas space 16, and thence by an outlet 21 which communicates with a chimney. The air-chambers 12, 13, communicate with each other by a passage 22, and when there are several air-chambers the similar passages forming communications between them are placed alternately at opposite sides or ends. Instead of the chamber 19 being made of the depth shown in Fig. 2 the bottom of it may be arranged at the position of the dotted line 45—45; but in that case the lamps 17 and oil reservoir 18 will be kept in the same relative position, so that they will be below the bottom (45) of the chamber, the chimneys or upper parts projecting up through openings in bottom (45). In some cases the outlet (21) for the gaseous combustion products may be arranged below the air-chamber 12, a suitable communication being made between it and the uppermost hot-gas space.

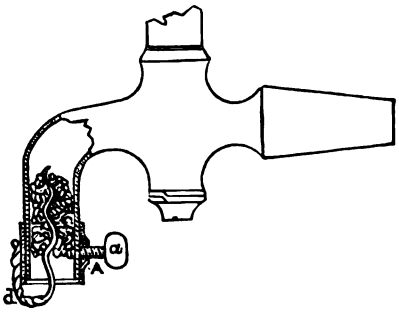
AMERICAN PATENTS.

237,312. METHOD OF, AND APPARATUS FOR, COOLING AIR IN BUILDINGS: GEORGE E. NOYES, WASHINGTON, B.C. Filed July 19, 1880. Issued Feb. 1, 1881.—*Claim* 1.



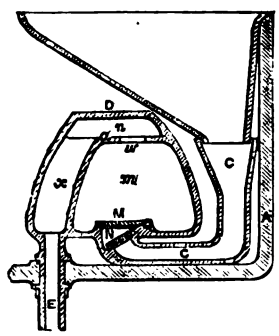
In the method or process of cooling air in buildings, reducing the temperature of a non-congealable liquid by the passage of ammoniacal gas in a coil-pipe or worm in contact with the liquid, and the liquid cooling the surfaces through which the currents of air are afterwards passed. 2. The method hereinbefore described of cooling air in buildings, the same consisting in withdrawing warm air from the room or hall and forcing the same through tubes which are surrounded by a noncongealable liquid, the temperature of which is regulated by the passage of ammoniacal gas in a coil-pipe in contact with the liquid, and then returning the thus-cooled air to the room or hall. 3. An apparatus for cooling air in buildings, consisting of a vertical cylinder, vertical tubes, and a coil-pipe, with supply and discharge air-chambers. 4. In an apparatus for cooling air in buildings, the combination of a tank or cylinder filled, or nearly so, with noncongealable liquid, a series of pipes arranged in the tank or cylinder for the passage of currents of air, and a coil-pipe or worm for the passage of ammoniacal gas. 5. The combination, with a cylinder filled, or nearly so, with a noncongealable liquid, a series of pipes arranged in said cylinder for the passage of currents of air, and a coil-pipe for the passage of ammoniacal gas, a flue with a force-fan for conducting air to the vertical pipes to be cooled, and a flue establishing a communication with the exit-passage of the air-pipes for carrying off the cooled air to the desired room or apartment.

237,336. FILTER: JAMES C. STOCK, NEWARK, N. J. Filed May 18, 1880. Issued Feb. 1, 1881.—*Claim* 1.



In a filter, the combination of the collar A, capable of being fastened to the faucet, the spiral wire *d*, secured to said collar, and the sponge or other filtering material, arranged as herein shown and described. 2. In a filter, the combination, with the faucet, of the collar A, the spiral wire *d*, the thumb-screws *a* and *c*, and the filtering material *e*, all arranged and operating substantially as and for the purpose set forth and shown.

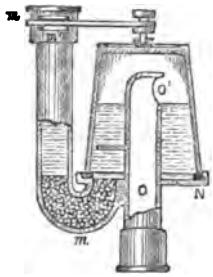
237,383. SEWER AND STENCH TRAP: CHARLES HALSTEAD, NEW YORK, N.Y. Filed Dec. 24, 1880. Issued Feb. 8, 1881.—*Claim* 1. A sewer-trap consisting of the



vessel D divided in two parts and connected, through an opening, *w*, with the pipe or passage *x* from the upper part, and valve M in the lower part or chamber, *m*, in combination with the eduction-pipe E, and the induction pipe, C, provided with a valve, N, situated close to the valve M. 2. A vessel, D, divided into two parts, connected through an opening *w*, with a pipe or passage-way, *x*, from the upper chamber, *n*, and a valve M, in the lower chamber, *m*, in combination with a vessel, A, and eduction-pipe E, arranged to operate substantially in the manner and for the purpose set forth.

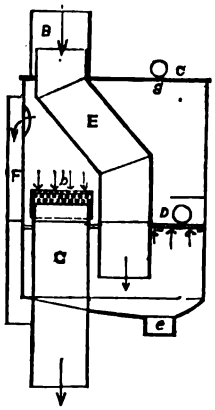
237,362. MERCURY-SEAL FOR STENCH-TRAPS: JOSEPH BENNOR, PHILADELPHIA, PA. Filed June 18, 1880. Issued Feb. 8, 1881.—*Claim* 1. A mercury-seal joint or stench-trap having an induction and eduction-pipe and an enlarged intervening chamber, whereby the mercury which forms the seal will, under superposed fluid-pressure in the induction-pipe, be lifted into and dispersed over the bottom of said chamber, permitting the discharge of such fluid, such mercury automatically sealing the trap after said discharge and rising in a solid column in the induction-pipe under back-pressure, as set forth. 2. In combination with the induction-pipe M, having a bend or neck, *m*, a platform, N, which forms the bottom of a mercury-spreading chamber, substantially as shown. 3. In combination with induction and eduction-pipes M O and a platform, N, a removable cap or section,

forming with said platform a mercury-spreading chamber, and means, substantially as described, for clamping or securing the same in position. 4. In combination with induction and eduction-pipes and an intermediate mercury-chamber, a ledge o^1, or projection for preventing mercury

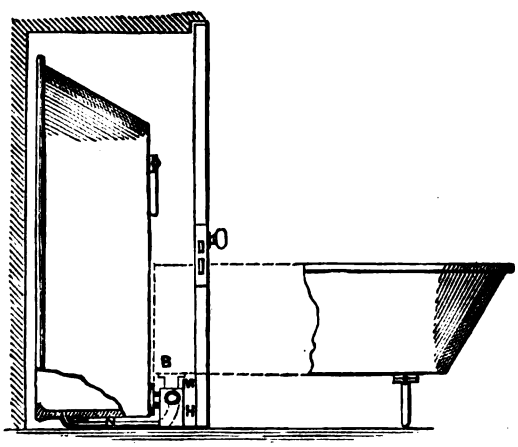


from being forced into eduction-pipe by violence of flow or pressure in the induction-pipe.

237,469. FILTER: JULIUS BERGEMAN, WOODBRIDGE, N.J. Filed July 26, 1880. Issued February 8, 1881. — *Claim* 1. As an improvement in filters, in combination with the inlet-pipe B, outlet-pipe C, and strainer D, arranged below the entrance of the outlet-pipe, the detachable branch pipe E, extending from the inlet-pipe down through the strainer D, so as to convey the inflowing water to the bottom of the case, substantially as herein shown. 2. In a filter in which the inflowing water is delivered below the filter or strainer, and the outflowing water is carried off from above the same, the combination of the overflow-pipe F, connecting the upper portion of the filter-case with the delivery-pipe, in the manner substantially as shown and described.

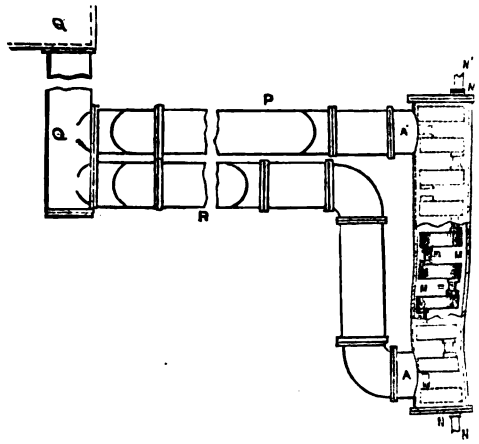


237,494. FOLDING BATH-TUB: GEORGE DAMEN, SOUTH BROOKLYN, N.Y. Filed Dec. 16, 1880. Issued



Feb. 8, 1881.—*Claim.*—The combination, with a bath-tub, of the flanged and elbowed pipes B and the studs H, having nipples K G, the latter forming, with pipes B, hinge-joints, and provided with cap-nuts I, as shown and described.

237,508. HOT-WATER APPARATUS: THADDEUS FAIRBANKS, ST. JOHNSBURY, VT. Filed Aug. 10, 1880. Issued Feb. 8, 1881.—*Claim* 1. In an apparatus for heating by water, the steam-passage M *m* M *m*, constructed as shown, in combination with the rigidly-mounted pipes N' N^2, water-vessel A, and a series of connecting-pipes attached near the top and bottom of the water-vessel for radiating heat from water circulated in the apparatus. 2. In combination with the upright vessel A, steam-pipes N' N^2, provisions M *m* for imparting heat from the steam to the water and allowing for changes of temperature, the outflowing water-pipes P, arranged horizontally in a series of



two or more, side by side, connecting Q, and return water-pipes R, also placed horizontally, all arranged for joint operation, as specified. 3. In an apparatus for heating buildings by hot-water, the expansion box or vessel Q' and connecting-pipe Q, in combination with the two series of horizontal pipes P R, and with the upright vessel A and means, substantially as described, for rapidly heating the water in the latter, all arranged for joint operation, as and for the purposes specified.

NOTICES OF MEETINGS.

SANITARY INSTITUTE OF GREAT BRITAIN.

The next ordinary meeting will be held on Tuesday, June 21st, when a paper on the Present State of the Sewage Question will be read by Professor Corfield, M.A., M.D.

THE NATIONAL HEALTH SOCIETY.

A MEETING was arranged by the National Health Society on May 23rd, at 13, Lowndes Square, by the kind permission of Mrs. Lawrence Cave (member of Committee of N. H. S.); Dr. Bristowe, President of the London Association of Medical Officers of Health, in the chair, to hear an account of volunteer auxiliary sanitary work, as practised during the past ten years at Hastings, from Mrs. Johnstone, the Honorary Superintendent of the Hastings Society for the Prevention of Epidemic Disease. Letters were read bearing strong testimony to the efficiency of the Society on the part of Dr. Frederic Bagshawe, President of the Medico-Chirurgical Society of Hastings; Charles Ashenden, Esq., M. O. H. for Hastings during the past seven years; and Douglas Duke, Esq., M. O. H. for the Rural District adjacent to Hastings.

It is hoped that voluntary sanitary work similar to that at Hastings may shortly be set on foot for London.

The complete set of oyster culture apparatus for laying and protecting the 'spat' in ponds and open grounds exhibited at the National Fisheries Exhibition by Messrs. Barnard, Bishop, and Barnards, of Norwich, has been awarded the gold medal and diploma of honour.